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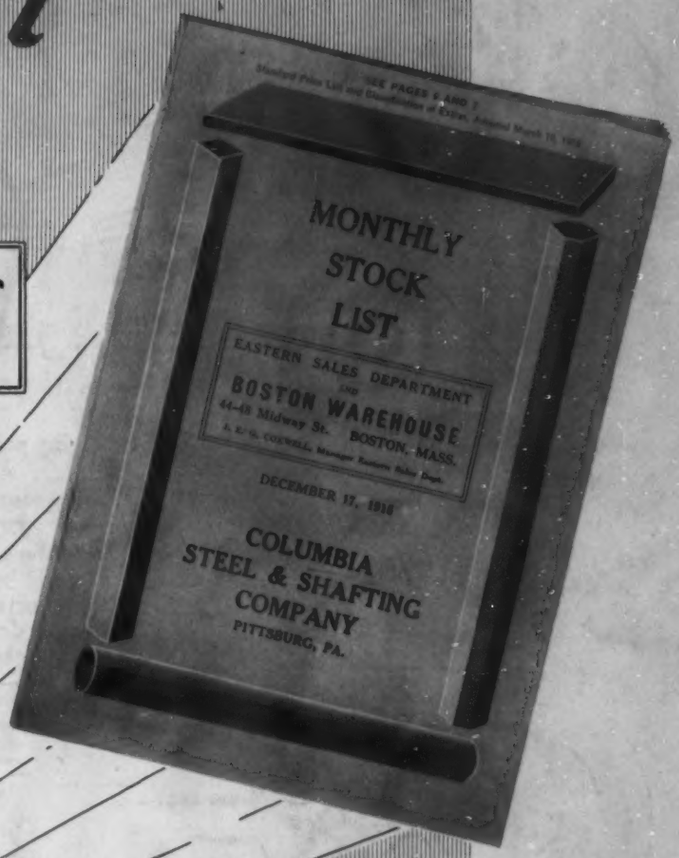

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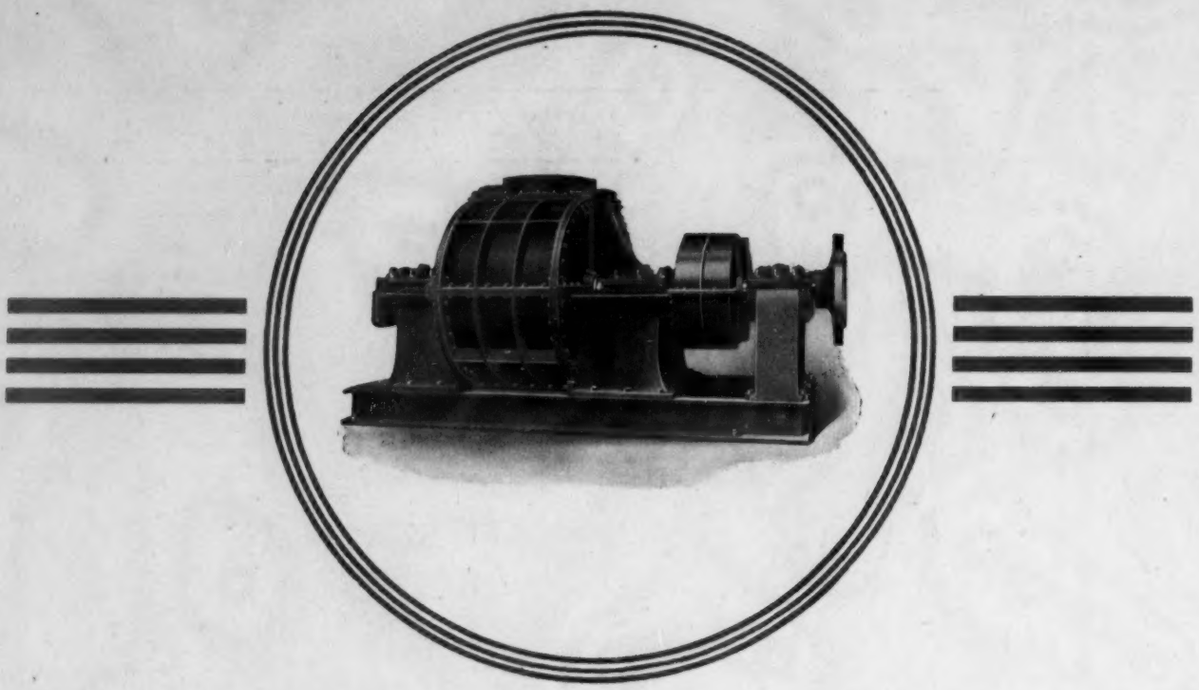

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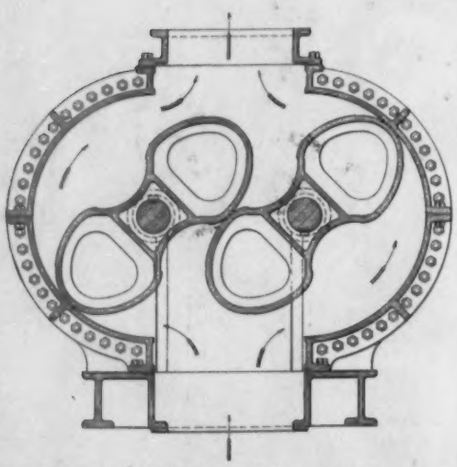

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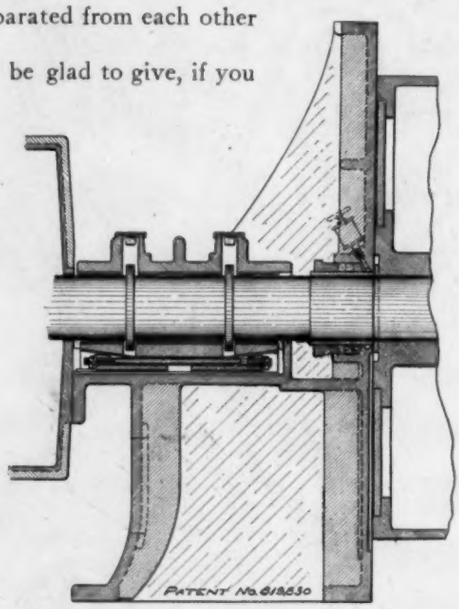

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THE IRON TRADE REVIEW

Vol. LVIII Cleveland, February 10, 1916 No. 6

Merger Has No Effect on Market

Midvale-Cambria Consolidation, However, Indicates Confidence in Future—Steel Prices Go Up—Railroads Buying Freely—Heavy Sales of Basic

ALTHOUGH the entire iron and steel industry has been set agog by the announcement of the Cambria-Midvale merger, the event is devoid of market significance, except as an indication of confidence in the immediate future. With the trade in its present flourishing condition, supply and demand are the supreme dictators of the hour, and those who profess to see a recrudescence of competition on a grand scale in the new consolidation are looking farther into the future than most well informed observers are able to see with any distinctness.

Continued Upward Progress

The steel market is pursuing the even tenor of its way with no indication of an early change in the constant drift toward higher prices, more extended deliveries and greater pressure all along the line. The week under review witnessed a farther advance of $2 a ton in the ordinary contract price for plates, shapes and bars, bringing the two latter items to 2c, Pittsburgh, and plates to 2.10c. These prices are for such shipment as the mill is able to make, mainly third quarter or beyond. Consumers seem willing enough to get under cover at these figures and to take chances on deliveries that are daily becoming more uncertain. The producers are so crowded that offers of such premiums as 3.50c, eastern mill, for the prompt shipment of large rounds, have failed to bring out tonnage.

Railroad Buying

In ordinary times the prevailing volume of railroad buying would be a factor of tremendous importance. Just now it is submerged in a welter of foreign and domestic inquiry. Nevertheless, the tonnage involved is worthy of respect. The Pennsylvania system is in the market for 25,000 tons of car plates, 5,000 tons of bars and a proportionate tonnage of shapes. The New York Central wants 6,000 tons of plates and 1,000 hopper cars. The Illinois Central shortly will spend $3,000,000 for new equipment. Domestic rail inquiries aggregate 16,500 tons. The Lenoir City car works of the Southern railway is inquiring for 16,000 tons of plates and shapes. These are simply leading items in the week's grist of news.

Finished Steel

Eastern mills are turning down a tremendous tonnage of finished materials without even quoting. Unusually heavy and persistent inquiries for plates, shapes and bars have been put out recently by railroads and ship builders. Eastern ship yards are anxious to cover for 30,000 tons of plates and shapes to go into work in prospect or actually in hand. In the west, the Ford Motor Co. is in the market for approximately 30,000 tons of reinforcing bars. French ammunition works, which recently closed for several hundred thousand tons of shell steel, are still in the market, seeking to cover for the last half at 2.80c, mill. This business has been declined, inasmuch as the manufacturers expect higher prices. European buyers also are sounding the shell steel market for the first half of 1917. The French government has placed additional, large, irrevocable finished shell contracts for 1917 delivery.

Pig Iron

The outstanding event of the week was the purchase of nearly 78,000 tons of eastern basic at $19.50, delivered, by the Lukens Iron & Steel Co. This transaction fixes the eastern basic market, which had been indefinite. There is also considerable sub-surface activity in pig iron, particularly in the Buffalo district, where prices on No. 2X are firm at $18.50. Recent sales, aggregating 15,000 tons, have practically cleaned up the resale iron in the Buffalo district. In the south, sales aggregating 6,800 tons are noted and Chicago melters are considering active inquiries totaling 10,000 tons. The Baldwin Locomotive Works has purchased from 1,500 to 3,000 tons of low silicon iron from southern producers and from 2,000 to 4,000 tons of northern foundry iron running 2.50 to 3.25 per cent silicon for May to September delivery. Pipe makers have taken 8,000 tons of low silicon iron in the east.

THE OPEN HEARTH

Cheaper Ore for Eastern Furnaces

CONTRACTS just placed by leading Port Henry operators for the construction on Lake Champlain of a modern iron ore dock, rivalling the great units of this kind on the Great Lakes, is of infinitely broader significance to the iron and steel industry than the mere fact that this will be the first structure of its type to be built on inland water in the east. The erection of this dock is rooted in the conviction that a comprehensive change is about to take place in the distribution of ore supplies in the eastern market through the cheapened transportation to be provided by the enlarged system of barge canals now being carried forward by the state of New York. The Champlain branch, which will open the way for the carriage of large loads from the Port Henry district to the Hudson river, is scheduled for completion by Sept. 1, 1916. A rate of 50 cents per ton, or less to New York harbor is expected against the present rate of $1.10. This will mean a material reduction in the delivered cost of Adirondack ores to eastern Pennsylvania furnaces.

What the Champlain canal will accomplish in getting Adirondack ores to the consumer at the lowest possible transportation cost, will be duplicated, it is believed, in the case of Lake Superior ores in the eastern market, when the canal system from Buffalo to the Hudson is completed at a later date. A striking statement previously made in the discussion of this subject, that by means of the Buffalo-Albany waterway, Lake Superior ore may be laid down in New York harbor, at a lower cost than in Pittsburgh, deserves to be repeated.

In putting through its barge canal system, the state of New York is doing a telling service for domestic industry and is strengthening the position of eastern iron and steel makers by making them more nearly independent of foreign sources of raw material.

Pay Rolls and Prosperity

THE WAVE of unprecented prosperity which has swept over this country in the past year presented itself in a tangible form to iron and steel company employes on Feb. 1, when advanced wage scales went into effect generally. The adoption of new scales gives men in some departments the highest wages offered in the history of the iron industry. If manufacturers of iron, steel and allied products continue to enjoy profitable business, it is not unlikely that mill employes will participate further in the gross proceeds.

Men usually designated as "common laborers" now are receiving an average of about 22 cents an hour in the rolling mill industry. Three years ago, they were paid 17½ cents an hour; that rate subsequently was advanced to 20 cents an hour, but most manufacturers reduced wage rates slightly during the recent prolonged period of depression. Skilled and semi-skilled employes have received substantial increases in pay since Dec. 31, last.

It was not generally known that the United States Steel Corporation would advance its men employed in the Connellsville regions of western Pennsylvania this year. Chairman E. H. Gary, it will be recalled, made no reference to wages in the Connellsville district when he outlined briefly the decision of the Corporation to increase wages of common labor about 10 per cent, in a statement made public Jan. 6. The low price of coke during the last three years, it seemed, did not warrant a change in wage scales.

However, the H. C. Frick Coke Co., a Corporation subsidiary, posted notices of an advance of approximately 10 per cent, bringing the wages of its employes to the highest level ever offered. The new Frick wage scale already has become a standard in the Connellsville regions. During the past 22 years, it is interesting to note, wages of miners and coke oven plant employes in the coking coal districts of western Pennsylvania have advanced about 105 per cent. In other words, the base rate for mining 100 bushels of room or rib coal has gone up from 78 cents to $1.58 since Feb. 10, 1894. In 1900, the base rate was $1.25; it dropped to $1.10 in 1903; was advanced to $1.20 in 1905; was increased to $1.35 in 1907, only to be reduced to $1.20 in 1908. No change again was made in the Frick scale until 1910, when the 1907 scale was re-adopted; that scale prevailed until 1912, when the base rate was put up to $1.44. The Frick company maintained that rate during the depression of 1914-15; during the latter part of 1914 and the early part of 1915, however, most independent coke producers reduced wages to the level provided by the scale which became effective Jan. 16, 1910.

Steel manufacturers of the United States always have paid the highest wages in the iron industry of the world; they have never hesitated about sharing profits with their employes, giving them advances in wages and improving social and economic conditions whenever possible. Whether those men who mold the national laws and policies of our country want to witness a continuation of the prosperity enjoyed by employers and employes alike since the building of a tariff wall by the terrible European war, remains to be seen. It is high time for the active consideration of an intelligent tariff to take the place of the temporary barricade provided by the war, and for the establishment of a merchant marine that will enable us to market our products abroad, thus keeping our industrial plants operating at nearly maximum capacity all the time.

We're Whacked on the Wrist

GEORGE P. WEST, the lively publicity genius of the committee on industrial relations at Washington, has given *The Iron Trade Review* a saucy slap on the wrist. The committee's bureau has found time to stop its busy press long enough to run off a statement just issued by Mr. West, who

THE OPEN HEARTH

chuckles over the sound recommendation made recently that the committee be driven from the national capital.

Those who read Mr. West's perfervid "truthful" account of the Youngstown strike may have thought he had exhausted his supply of yellow dyestuffs. But if he did he has been able to run the blockade or in some other manner has imported a new stock. Listen to Mr. West in his saffron glee:

"Fortunately the gunmen, detectives and subsidized officials with which the Steel Corporation governs its steel towns and suppresses organization and free speech have not yet extended their rule to Washington, and the ravings of *The Iron Trade Review* are doomed to futility."

We really think the committee is indebted to *The Iron Trade Review* for advertising, but now that Mr. West has performed a similar service for *The Iron Trade Review* in an extremely limited way—the balance may be considered struck, even though the committee does get the best of this charitable negotiation.

And as for ravings, *The Iron Trade Review* modestly bows before the infinitely superior variety employed by Mr. West. The only things we envy Mr. West are his youth and good looks.

Preparedness in Practice

AFTER being encouraged by the government to engage in the manufacture of armor plate, it is now proposed that the national administration repay producers for their loyalty by destroying their business, representing a capital investment of $20,000,000. The bill providing for a government-owned plant means nothing less than outright confiscation of the three private industries in this country devoted to making armor plate. That fact was set forth in vigorous language by manufacturers who appeared at the recent hearings on the administration measure before the senate committee on naval affairs.

An utterance particularly strong in this direction was the final statement made to the committee by President E. G. Grace, of the Bethlehem Steel Co. What a striking contrast there is between the treatment of private industry in this country and the attitude of the German government toward the private interests!

Every possible fact and figure that did not involve the divulgence of special secrets of the business was given frankly to the committee by the manufacturers who have been harassed and heckled by congress for many years. The exposition they made was so thorough and convincing that it is inconceivable that any prejudice existing heretofore against armor plate makers would not be removed from the minds of legislators. It was plainly shown that not only are profits on armor plate contracts below the normal return on business enterprises, but that it has been a common experience of producers to lose money on such contracts when the tonnages involved are insufficient to necessitate continuous mill performance for any considerable period. But even in the face of the incontrovertible facts made public, the manufacturers offered to show members of the committee and Secretary of the Navy Daniels, or any other responsible government authority, details showing cost figures and other items, which, as a matter of protection, the manufacturers could not consent to have made public. Going further, they offered to let any public accountant, mutually acceptable to the government and manufacturers, go through the latter's plants and books to get data on the cost of manufacture and any other material wanted, provided the results of such a searching investigation were treated confidentially so that competitors could not come in possession of these highly desirable facts. But their proposition was met with scorn.

Could the manufacturers have possibly done more? Indeed, could they have been reasonably expected to offer to do so much? Assuredly they have done more than their part, not only to protect their own business from destruction at the hands of their government, but also to protect the government against itself. It is easily probable that the United States would, in the event of war, find itself unable to supply from its own plant sufficient quantities of armor, even admitting the doubtful fact that the plant would be operating successfully.

It is rather incongruous that the President of the United States should go speech-making over the country, urging preparedness and at the same time support a measure whose enactment would be a severe blow against national defense. The political rant, and demagogic utterances about "excessive profits" of armor plate makers, the libels that they are back of a preparedness program for financial gain, and similar nauseating harangue have apparently reaped their ill effects by the weak yielding of the administration to the socialistic proposal carried in its armor plate bill.

There is reason to think there are democratic senators of the naval affairs committee who, after listening to the testimony of armor plate manufacturers, were forced to the belief that enactment of the bill would be a gross injustice and harmful to the interests of the United States government. Yet, with the administration lash back of them, they showed themselves ready to vote in favor of the measure. Others, convinced against their will, were of the same opinion still.

Prices Present and Past

Quotations on leading products February 9, average for January, 1916, average for November, 1915, and average for February, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Feb. 9, 1916.	Aver. for Jan., 1916.	Average for Nov., 1915.	Aver. for Feb., 1915.
Bessemer pig iron, Pittsburgh..	$21.45	$21.32	$17.45	$14.63
Basic pig iron, Pittsburgh.....	18.70	19.20	16.70	13.45
No. 2 Fdy. pig iron, Pittsburgh	19.45	19.95	16.45	13.95
Northern No. 2 Fdy., Chgo....	18.50	18.50	17.12	13.00
Lake Superior Charcoal, Chgo..	19.75	19.25	17.50	15.75
Mall., Bess., Chgo.....	19.00	19.00	17.12	13.00
Southern No. 2, Birmingham...	14.50	14.13	11.75	9.50
Southern Ohio No. 2, Ironton..	18.00	17.00	14.88	12.75
Basic, eastern Pa.....	19.50	19.50	17.75	13.75
No. 2X Virginia furnace.....	18.00	17.50	15.50	12.50
No. 2X foundry, Philadelphia...	20.00	19.75	17.50	14.25
Ferro mang., Balti., (forward)..	125.00	125.00	100.00	100.00
Bessemer billets, Pbgh.....	34.00	33.75	27.75	19.50
Bess. sheet bars, Pbgh.....	34.00	33.75	28.25	20.00
Op.-h'th sh. bars, Pbgh.....	35.00	34.75	28.50	20.00
Open-hearth billets, Pbgh.....	35.00	34.75	28.00	19.50
Steel bars, Chgo.....	2.39	2.03	1.79	1.31
Steel bars, Pittsburgh.....	2.00	1.865	1.625	1.10
Iron bars, Philadelphia.....	2.259	2.259	1.759	1.15
Iron bars, Cleveland, local del'y.	2.25	2.00	1.50	1.15

	Prices Feb. 9, 1916.	Aver. for Jan., 1916.	Average for Nov., 1915.	Aver. for Feb., 1915.
Iron bars, Chgo. mill.....	$1.90	$1.83	$1.48	$1.04
Beams, Chgo.	2.39	2.03	1.79	1.31
Beams, Pittsburgh	2.00	1.865	1.625	1.10
Beams, Philadelphia	2.159	2.159	1.959	1.25
Tank plates, Pittsburgh.....	2.10	1.875	1.625	1.10
Tank plates, Chicago.....	2.44	2.05	1.79	1.27
Tank plates, Philadelphia.....	2.409	2.409	1.959	1.25
Sheets, blk., No. 28, Pbgh.....	2.60	2.58	2.22	1.80
Sheets, blue an., No. 10, Pbgh.	2.00	2.45	1.80	1.30
Sh., galv., No. 28, Pbgh.....	4.75	4.75	3.90	3.01
Wire nails, Pittsburgh.....	2.20	2.125	1.87	1.55
Connellsville fur. coke, contr...	2.50	2.38	2.35	1.65
Connellsville fdy. coke, contr...	3.50	3.00	2.96	2.25
Heavy melting steel, Pbgh.....	17.50	17.50	15.31	11.62
Heavy melting steel, east'n Pa..	16.50	17.00	14.50	10.50
Heavy melting steel, Chgo.....	15.00	15.50	13.13	9.44
No. 1 wrought eastern Pa.....	22.50	22.50	17.00	12.00
No. 1 wrought, Chgo.....	15.00	15.50	12.75	8.88
Rerolling rails, Chgo.....	17.00	17.68	14.31	9.62
Car wheels, Chgo.....	14.00	14.75	12.73	10.00

(For Additional Prices See Page 362.)

Eastern Basic Order Stirs Market

Lukens Iron & Steel Co. Takes Nearly 78,000 Tons at $19.50 Delivered —Big Export Inquiry Appears for Southern Iron

Philadelphia, Feb. 7.—Heavy contracting for basic by the Lukens Iron & Steel Co., the principal eastern buyer of the grade, was the outstanding feature of the week's market in this territory. This consumer distributed among four or five makers, a total of 77,500 tons for shipment over the last five months of the year at $19.50, delivered. This seems to set the minimum figure in the eastern basic market where prices of late have been indefinite. Several of the makers originally quoted higher than this figure to the Lukens company, but subsequently cut their quotations to correspond with those made by other furnaces. A Phoenixville, Pa., consumer has inquired for 1,000 tons of prompt basic and has been quoted $19.75, delivered. While apart from the large purchase of basic, the market volume has not expanded appreciably, there is a better tone to conditions, prices seem firmer and miscellaneous buying is picking up. The Baldwin Locomotive Works, which asked for 1,500 to 3,000 tons of 1.15 to 1.50 and 2,000 to 4,000 tons of 2.50 to 3.25 silicon iron for May-September delivery has closed and the business, especially the lower silicon, is thought to have gone to Alabama makers. A Pottstown, Pa., iron maker is reported to have bought 5,000 tons of mill forge. Cast iron pipe makers along the Delaware river have made further purchases of low silicon iron at about $18.50, delivered, which an eastern Pennsylvania steel maker has been offering from an old stock.

The total of sales made in the last few days has been about 8,000 tons. The Pennsylvania railroad has inquired for 2,300 tons of No. 2 high manganese and low silicon grades for second quarter delivery at Altoona. Northern No. 2 now is quoted at about $20 to $20.50, Philadelphia. One Virginia maker has raised its price to $19.50, furnace, but the leading Virginia maker still is offering iron at $18, furnace, for No. 2X. The low phosphorus iron market is quiet, with unchanged prices. There is a good demand from abroad but freights cannot be secured to close this business. Italy will buy low phosphorus and special bessemer on a freight of $20 to $25 a ton, but such a rate is not readily obtainable.

Virginia makers and those in eastern Pennsylvania now are able to ship to Massachusetts points by reason of the Boston & Albany and Boston & Maine embargoes having been raised, but the ban on New Haven railroad delivery still is maintained.

Melters More Active

Buffalo, Feb. 8.—Consumers of the various grades of pig iron supplied from the furnaces of the Buffalo district are displaying a more lively interest in their purchases. Sales during the week totaled about 15,000 tons of foundry and other grades, but the greater part of the iron moved was the remnant of the volume of resale iron held here since last spring. The disposal of the resale iron has been a feature of the market to some extent for the past several months, but the stock is now practically wiped out.

Within the past 24 hours a stiffening tendency in prices has appeared. While the maximum of the schedule quoted for the past few weeks has not been changed, the minimum of $18 has been withdrawn, with the exception of quotations on low grades. No. 1 foundry is now quoted $18.75 to $19. The price of No. 2X has become $18.50 to $18.75, while gray forge and No. 3 foundry may be obtained at a minimum of $18. Malleable and basic are both holding to a minimum of $19. Furnace interests report that the only disturbing feature in an otherwise strong

(*For complete prices see page* 362.)

market is the continuance of the railroad embargoes on tonnage intended for points at tidewater and into New England.

Lull at Cleveland

Cleveland, Feb. 8.—The Cleveland market is quiet, a seasonable lull having followed the heavy buying movement of the past three months. Melters, however, are taking iron freely and the market displays the characteristic firmness which has prevailed for some weeks past. Sellers welcome the temporary respite. No. 2 foundry iron is firm at $19, Cleveland furnace, for local delivery, and $18.50 for delivery outside of the city.

Inquiry for Second Half is Appearing

Chicago, Feb. 8.—After a decided lull during January inquiry for northern pig iron is returning. Probably 5,000 to 10,000 tons is now actively before sellers. Most of this is for last half delivery and negotiations have not proceeded sufficiently far to bring about sales. Melters continue to ask for small tonnages for prompt delivery to provide material covering business received beyond previously estimated requirements for first quarter. This has furnished a continuing business and now it is reinforced by last half demand.

Northern No. 2 foundry is quoted for the entire year at $18.50, Chicago furnace, and malleable at $19. There has been no indication of these prices being shaded but should inquiry continue and actual demand for last half iron become much stronger it is possible a higher level may be reached. Charcoal iron remains unchanged with a considerable spread between various makers, in proportion to the tonnage on their furnace books.

Southern iron is unusually quiet and comparatively little business is being done in this district. First half iron is quoted by most furnaces at $15, Birmingham, but 50 cents per ton less appears to be possible; this is probably resale iron holding over from several months past. Little interest is manifested in last half delivery and a considerable premium is being asked by makers. Iroquois stack No. 2 is practically ready to be blown in and probably will be making iron within the next week.

Pig Iron Slow

Cincinnati, Feb. 8.—The pig iron market has dragged during the past few days, and sales are light. Prices continue strong, as the majority of furnaces have full order books running through the first half of the year, and shipments and consumption are heavy. In no instance is it known that stocks in furnace yards are increasing. Southern No. 2 foundry is being offered by one stack at $14.50, Birmingham basis, for the first half, and at $15 for the second half. Other southern stacks are firm at quotations ranging from 50 cents to $1 higher. Southern Ohio No. 2 foundry is unchanged at $18, Ironton basis, for the entire year. Silvery iron is given at from $24.50 to $25. furnace, for the 8 per cent grade.

Scattering Inquiry in St. Louis

St. Louis, Feb. 8.—Inquiries are out in this district for 1,200 tons of northern basic iron, 400 tons of No. 2 northern coke iron, and for a considerable scattering tonnage. Sales last week included 400 tons of northern and southern in one order and several smaller tonnages. Southern No. 2 is quoted at $15 to $15.50, Birmingham, for first half delivery and $16 to $16.50 for second half delivery. Chicago iron is offered at $18.50 to $19, and Ironton iron at $18 to $18.50.

Warrant Holders Share Prices

Birmingham, Ala., Feb. 7.—The aggregate tonnage of pig iron booked during the past week was considerably larger than for the past three weeks. One of the producing interests sold 2,800 tons of special analysis iron at a premium. A total of 3,500 to 4,000 tons was booked by other interests, chiefly in small lots. The prices ranged from $15 to $15.50, furnace. Owing to the lull of the past few weeks, there has come a tendency on the part of some of the interests to quote $15 per ton for first half delivery. Though some of the companies still hold firmly at $15.50 for first or second quarter delivery. Undoubtedly, however, considerable floating warrant iron is finding its way on the market at a price considerably lower than the Birmingham basis. The sales manager of one of the large producing companies has just returned from a trip through the middle west and east. He reports that Birmingham furnaces are holding pretty firmly at $15 to $15.50 for the first half in those territories; and that for the last half of the year $16 has been asked. He heard of some warrant iron at a low figure. The activity in the stock market has had its effect on the pig iron market; and this, together with the fact that the furnace companies are crowding holders of warrants for the disposition of iron on yard, has had its bearing on forced prices, in many instances. In other cases, the freight differential over Birmingham, which is given away by furnaces in certain favored territories, has been reflected on the Birmingham base price. Also there is considerable moving from Alabama by water, which means some saving in the freight.

Prices Decline as Quiet Continues

Pittsburgh, Feb. 8.—The extended period of inactivity is having an effect on the prices of pig iron. Several anxious sellers have disposed of tonnages the last two or three weeks at quotations slightly below what had been regarded as market levels. It is believed, however, that prices will advance rather sharply just as soon as general buying begins.

Bessemer pig iron, which had been well pegged at $21, valley furnace, is being offered at $20.50, valley, by some interests, the Colonial Steel Co. having been able to purchase 2,000 tons of standard bessemer last week at that price. Another consumer paid $21, valley, for 1,000 tons of this grade. The basic pig iron market continues quiet and uncertain, although some inquiry has come out for second quarter and second half delivery. While most dealers are asking $18, valley, for basic iron, yet it is apparent that a cautious buyer could shade the general asking price, it being believed by some that iron could be obtained at slightly less than $17.75, valley.

No. 2 foundry and malleable iron are being offered at a spread from $18.50 to $19, valley, at which range some tonnage for shipment the second half of the year has been sold. The situation for foundry iron in the immediate Pittsburgh district borders on a state of lethargy, owing to the molders' strike, which was declared Dec. 13. No progress has been made in settling labor troubles, although some casting manufacturers now are operating plants in part. Manufacturers of basic, foundry and malleable iron have been able to accumulate some surplus stock during the last few weeks; until surplus stocks are absorbed,, prices are not expected to change much.

Much Sub-Surface Activity

New York, Feb. 8.—Miscellaneous buying of moderate tonnage is continuing in the pig iron market in metropolitan and adjacent territory; the tendency is towards an expansion of volume and brisker activity is expected soon. There has been more buying, however, than appears on the surface. Buffalo furnaces have been selling considerable metal to which only general reference is being made, but the tonnage is important and prices in that district have firmed up so that $18.50, furnace, for No. 2X now is the common figure. In upper New York state and New England

(For complete prices see page 362.)

territory buyers in recent days have closed for 10,000 to 15,000 tons, principally for last half, but in some cases, for delivery before July. The freight embargo situation is better in upper New England by way of the Boston & Maine and Boston & Albany roads which now are opened.

Lower New England points reached by the New Haven railroad still are in trouble, however, as the embargo against that road remains in force. The Pennsylvania railroad has lifted, as far as Jersey City, its embargo east of Trenton. New sales in the immediate metropolitan district are small. Prices are steady at $20 to $20.50, tidewater, for No. 2X. Some large export inquiries continue to appear, but they usually are barren of result, because of freight embargoes and the high freights. To Italy the rates on pig iron now are $30 to $35 per ton. New York bankers in the week asked for prices on 50,000 to 100,000 tons of southern iron for export, which was to replace Cleveland No. 3 English iron. One inquiry for 10,000 tons of low phosphorous for England also came out.

Some Consumers in Panic

Fear Spreads That Ferro May Not Be Obtainable—
Inquiry for 10,000 Tons Unsatisfied

Pittsburgh, Feb. 8.—The shortage and resultant high prices of 80 per cent ferro-manganese threatens to seriously affect some of the smaller consumers in this district, who literally are scrambling for material. As high as $200 a ton, seaboard, which is said to be the highest price obtained in a decade, has been paid for a small tonnage of foreign ferro-manganese for prompt delivery. The adoption of more economical operating practices has tended to materially strengthen the market for spiegeleisen, which has advanced from $30 to $40 a ton the last few weeks. Domestic makers have sold some spiegel at $40, furnace. Specifications for 50 per cent and lower grades of ferro-silicon are heavy, but not much new buying is reported, this being attributed to the fact that most producers are unable to ship material until after July 1.

Ferro Going Up

New York, Feb. 8.—Manganese alloys continue their lofty advance, especially for early delivery. Buyers who have been in the market the past week for carload lots of either English or domestic ferro-manganese for spot shipment found difficulty in obtaining any metal under $200, seaboard, for 80 per cent. Carload sales of English were made at $210, seaboard, while sellers state there is business obtainable at $225, seaboard, if the metal could be had. Off-grade lots of domestic ferro-manganese were sold this week at about $3 per unit of manganese, or on the basis of $240, furnace, for 80 per cent metal.

Only a limited quantity of English metal continues to be offered for last half delivery at $125, seaboard, and reports from abroad are that it is more difficult to obtain licenses to ship from the British government. A liberal inquiry, principally for last half shipment, probably about 10,000 tons, remains in the market from domestic consumers and sellers have been unable to get the material to supply it. Some of this tonnage is wanted for delivery before July. The steamer WELCHMAN arrived at Philadelphia the past week with about 350 tons from England. The ROWANMORE is on her way with 500 to 1,000 tons and the SWANMORE was scheduled to sail this week with several hundred tons.

Spiegel Up $5 a Ton

Spiegeleisen for early delivery is squaring itself to the level of $2.50 to $3 per unit of manganese, now being quoted on spot ferro-manganese. Several thousand tons of domestic for shipment prior to July 1, which were available under special conditions, were sold this week at $40 at the furnace, for 20 per cent, an advance of $5 a ton over the recently announced price of $35, furnace, on contracts. Except under special circumstances, there is practically no domestic spiegel unsold for first half.

Rivet Demand Growing

Pittsburgh, Feb. 8.—The demand for nuts, bolts and rivets, manufacturers say, is increasing steadily. The adoption of higher prices by manufacturers of bar steel and bar iron likely will be followed by the corresponding increases in the price of nuts, bolts and rivets. Structural rivets are commanding 2.70c. Some material is being shipped to foreign countries.

(For complete prices see page 362.)

Shipments Uncertain

Car Shortage is Serious and Coke Prices Show Big Spread

Pittsburgh, Feb. 8.—A number of blast furnace managers have sent representatives into the Connellsville regions in an effort to hasten the shipment of coke. Consumers are complaining considerably about the uncertainty and irregularity of coke shipments, due to congested traffic conditions, and some furnaces, on several occasions, have made preparations to bank fires. Despite uncertain shipments, not much inquiry for spot 48-hour coke is reported. Blast furnace fuel for prompt delivery is selling at a spread from $3.25 to $3.75, ovens. No definite inquiries for future delivery are pending. The market for foundry coke is unchanged in position. All cokemakers have advanced wages to the scale adopted Feb. 1 by the H. C. Frick Coke Co. *The Connellsville Courier,* for the week ending Jan. 29, says production was 442,616 tons, an increase of 40,210 tons compared with the week previous.

Coke Consumption Good

Cincinnati, Feb. 8.—Consumption of coke from southern fields is equal to production, and several makers state that they cannot fully supply contracts. Cold weather has handicapped oven operators during the past week, and the labor situation has been acute since the first of the year. Transactions are at a minimum, as the demand is chiefly for spot coke, and ovens have none of this for sale. No large inquiries are pending. Prices are firm and show a tendency to advance on Pocahontas, Wise county and New River makes.

St. Louis Lags

St. Louis, Feb. 7.—Coke remains dull in this district, with Connellsville 72-hour foundry grades held at $4.50, ovens.

Employes of the tool steel department of the International High Speed Steel Co., Rockaway, N. J., went on strike for an increase of 20 per cent. The company compromised with an offer of 10 per cent and the men accepted. Manager Herbert Halcomb had the furnaces relighted.

The new foundry of the Premier Aluminum Foundry Co., Ivanhoe road and Nickel Plate railroad, East Cleveland, has been placed in operation. It is equipped to manufacture aluminum, brass, bronze and copper castings.

Plate Orders Turned Down

Inquiries from Railroads and Ship Builders Are Heavy But Mills Are Unable to Offer Relief

Philadelphia, Feb. 7. — Railroads which buy in this district have put out during the past week some large inquiries for plates and other forms for the building of cars in their own shops. The Pennsylvania railroad, which is to construct 1,350 all-steel cars at Altoona, has inquired for 20,000 to 25,000 tons, the Lenoir City, Tenn., shops of the Southern Railway 10,000 to 12,000 tons and there are other lots in the market. As early delivery as possible is wanted. Most plate makers have declined to quote on this business in view of their badly-congested order books. A similar condition prevails in the market for ship plates, where the yards are offering with no takers at least 20,000 to 30,000 tons at the moment to cover work in prospect or actually in hand. An attractive export inquiry for 7,500 tons of plates has received the same treatment. These examples of tonnage being rejected reflect the tremendous strength and activity of the eastern plate market where makers, despite record outputs, are getting farther and farther in arrears on their deliveries. Tonnages now are being alloted to buyers under the strictest requirements. Some consumers already having exhausted by specification, their first quarter contracts have been placing at 3.09c, eastern Pennsylvania mill, supplemental tonnages for mill orders to be given in that period, but for delivery as the producer is able, which in some cases means not less than eight months. No guarantees of delivery are being made by the seller. Eastern mill prices on plates for uncertain future delivery now range from 2.75c, Pittsburgh, to 3.00c, mill, or about 2.909c to 3.10c, Philadelphia. One large eastern producer is entirely out of the market. The old Glasgow plate mill at Pottstown, to be operated by the Nagel Steel Co., a new company recently organized, will very likely commence operations by rolling light gages.

Plates Are Firm

Cleveland, Feb. 8.—Negotiations are still pending for several large bulk freighters for 1917 delivery, but no action has been taken. Ship builders will close shortly for plates for several smaller boats already ordered. Prices of plates are firm and no difficulty is experienced by local mills in securing from 2.75c to 3c, Pittsburgh.

Plates Continue Scarce

Chicago, Feb. 8.—Steel plates participated in the recent increase of $2 per ton on finished steel products and the nominal quotation now is 2.29c, Chicago mill. As in the case of other material, anything like prompt delivery, wherever obtainable, commands a heavy premium, and it is becoming increasingly difficult to place business at any price.

Plates Advanced as Demand Increases

Pittsburgh, Feb. 8.—Because of prevailing high prices of car material, it is not likely that any of the trunk line carriers will buy more cars than they actually need this year. Plates, on Feb. 4, were advanced by the Carnegie Steel Co. to 2.10c for delivery at the convenience of the mill, which means for shipment the third quarter of the year. Independent manufacturers adopted the 2.10c figure just as soon as it was announced publicly. As high as 2.50c is being quoted by some mills for second quarter delivery, and 3c has been paid in a number of instances for small tonnages for prompt shipment.

Cast Pipe Steady

With Pig Iron Stationary Market is Firm—Demand Fair

Chicago, Feb. 8.—Cast iron pipe is firm and steady at prevailing quotations, which have ceased to rise since pig iron seems to have attained a steady level. Bids were opened at Milwaukee Feb. 9 on 1,700 tons and at Kansas City, Mo., the same day on 1,085 tons. The United States Cast Iron Pipe & Foundry Co. has been awarded 1,000 tons at Duluth. Bids were opened Feb. 3 at Milwaukee on 1,700 tons of 60-inch sewer pipe and the award has not yet been made. It is understood a wide range of prices was submitted.

Inquiries are More Numerous

New York, Feb. 8.—Export inquiries for cast iron pipe are more numerous, particularly for South and Central America, and a large lot of 10,400 tons of 3 to 24-inch for Salto, Mercedes, Paysandu, Uraguay, has been offered for bids by Stone & Webster. An inquiry also has been put out for 1,370 tons of 10 to 14-inch for Tegucigalpa, Honduras. On the 4,000 tons of 18 to 36-inch pipe for Ottawa, Canada, the National Iron Works, Ltd., of Toronto, have submitted the lowest bid of $37 per ton, f. o. b. Ottawa, or $38 on the street. The United States Cast Iron Pipe & Foundry Co. has received 700 tons of 16-inch for the Consolidated Gas, Electric Light & Power Co., of Baltimore. R. D. Wood & Co. have been formally awarded the 5,810 tons of 3 to 6-inch pipe for Baltimore, upon which they recently submitted the lowest bid. The National Pipe Co., of Canton, O., has been awarded the year's requirements of 4 to 12-inch water pipe. Pawtucket, R. I., took bids Feb. 9 on 450 tons of 4 to 16-inch pipe. The market is not so active in this territory, but it remains very firm.

(*For complete prices see page 362.*)

Inquiries Are Normal

Birmingham, Feb. 7.—Cast iron pipe manufacturers report that business is holding up remarkably well considering the season and recent advances in price. Some fair tonnages were booked during the past week, and inquiries are normal for this time of year. The following prices are quoted, per net ton f. o. b. cars at the plants for standard pipe: 4-inch, $27; 6-inch and up, $25; with $1 per ton extra for gas pipe and 16-foot length pipe.

Tin Plate Nearing Price of $4 Base

Pittsburgh, Feb. 8.—Tin plate will be quoted uniformly at $4 per box in the near future, according to present indications. Independent manufacturers in a position to ship additional material this year, have experienced no difficulty in obtaining $5 a ton above the prevailing minimum price, or $8 a ton above the price at which tin plate was offered when books for the 1916 season were opened last autumn. Numerous inquiries for tin plate for export are pending; considerable tonnage for shipment to foreign ports has been sold this month at slightly above $4 per base box. Tin plate mills are being driven at maximum capacity; most of them, however, are inconvenienced by the shortage of tin bars.

C. W. Leavitt & Co., 30 Church street, New York City, have been appointed sales agents in this country for the Carlton brand of ferro-manganese manufactured by the Carlton Iron Co., Derbyshire, Eng. The sale of this brand of ferro-manganese in this country previously was handled by the late G. F. Ehrenzeller, Philadelphia.

New Prices Mean Little

Bars Go Up Another Notch But Spot Buyers Are Forced to Pay Large Premiums

Cleveland, Feb. 8.—A sale of 11,000 tons of bars for second and third quarter delivery has been made. The second quarter tonnage was placed at 2.25c and the third quarter at 2.50c, Pittsburgh. The ability of the seller to make deliveries resulted in the high premium secured. It is understood that the Ford and Dodge automobile companies have covered their bar requirements for the balance of the year. The advance of $2 a ton to 2c, Pittsburgh, on shapes and bars, and to 2.10c on plates, announced last week, has had no appreciable influence in checking urgent demands from buyers. Coincident with the advance, several makers opened their books for third quarter business on desirable lots. The leading interest has taken some contracts of this character, while several prominent independents also have adopted the same course. However, some independents still are refusing to take business into the second half. Buyers are anxious to cover requirements into the third and fourth quarters. Hoops also were advanced 2.20c, Pittsburgh, on Feb. 4.

Steel Bars Go Higher

Chicago, Feb. 8.—Nominal quotations on steel bars have been advanced $2 per ton and now stand at 2.19c, Chicago mill. Nothing can be bought at this price and the few mills which have some tonnage to deliver promptly continue to obtain a large premium, as high as 2.49c to 2.54c, Chicago, not being uncommon. The leading interest has apportioned the remainder of its tonnage for 1916 and some independents are about to take the same course. This action is being practically forced by importunity on the part of consumers who desire to obtain as much protection against their future business as possible.

Bars in Heavy Demand

Pittsburgh, Feb. 8.—Demand for steel bars for domestic consumption and for the manufacture of war material continues active. Belligerent European nations are attempting to buy tremendous tonnages for second half delivery and unauthentic reports are heard of large contracts having been placed recently in this district. The Ford Motor Co., Detroit, which is making arrangements for the erection of a number of new buildings, is negotiating for from between 30,000 to 50,000 tons of reinforcing bars and structural material. Steel bars on Feb. 4 were advanced $2 a ton to 2c by the leading interest, and that figure since has been adopted by independent manufacturers for shipment at the convenience of the mill. Iron bars are commanding from 2.20c to 2.30c. The Carnegie Steel Co. and other manufacturers have advanced prices of hoops and bands $2 a ton to 2.20c and 2c, respectively. Specifications for both products are heavy and deliveries are deferred from three to five months. Shafting is being held at 40 per cent off the list for carloads by most manufacturers in this district.

Hold For Higher Prices

Philadelphia, Feb. 7.—Eastern Pennsylvania and nearby makers did not participate in the recent heavy export buying of large rounds for ammunition making principally by French steel works, for delivery in the last half, reported in last week's *Iron Trade Review*. These mills were offered 2.80c, mill, on good-sized lots of the business, but declined the orders, as they are anticipating that higher prices eventually will be paid for such material for delivery after July. For delivery before July round tonnages also have been offered eastern makers at 3.50c, mill, but there have been no sales. It is anticipated that domestic shell makers soon will be closing heavy lots of last half steel as foreign belligerents are reaching the point of placing important additional contracts for finished ammunition, and in fact already have concluded some orders. Regular domestic buyers of soft steel bars continue to inquire for contract tonnages but most makers are not selling in this way and will quote only on specific requirements. Since the Carnegie Steel Co. price advance of $2, Feb. 4, the contract market is regarded as 2.00c, Pittsburgh, or 2.159c, Philadelphia, but specific sales are being made at 2.25c to 2.35c, Pittsburgh, and even higher. The Pennsylvania railroad has inquired for about 5,000 tons of bars for cars to be built at Altoona.

French Inquiry Heavy

New York, Feb. 8.—French ammunition works, which recently placed several hundred thousand tons of large rounds for last half delivery with steel makers in this country, still are carrying forward negotiations for a further heavy tonnage for that period. They are seeking to buy at 2.75c to 2.80c, mill. They also are negotiating for first half of 1917 delivery. While the mills are not desirous of closing steel contracts for the latter period at present, it is learned that the French government has placed in this country some additional contracts for finished shells, which are for 1917 delivery and are made irrevocable. It is thought other similar contracts will be placed soon. A sale of several thousand tons of large rounds for delivery before July, was made to a domestic shellmaker at 3.25c, mill. Makers state that on ordinary soft steel bars, 2c, Pittsburgh, readily is obtainable from the domestic trade for delivery in four to six months. There is considerable inquiry for steel bars for export upon which 2.25c, mill, has been offered. This includes one lot of 2,000 tons of horseshoe bars.

Deal Only With Old Customers

Buffalo, Feb. 8.—Mills are booked so far in advance that little encouragement is given to offers of additional tonnage. The producers for the most part are declining to deal with any but established customers, and with them only upon a basis of prompt specifications subject to the mill's convenience. In such cases the mills are able to get out only occasional amounts of extra tonnage on such open rolling dates as may occur. The chief concern of the producers is to get out tonnage booked several months ago. Prices are holding to the advance of 2c announced several days ago.

Bar Iron Shows Strength

Chicago, Feb. 8.—Although quotations remain steady at 1.90c to 2.00c, Chicago, on iron bars, most tonnage is now moving at 1.95c, Chicago. Orders are being taken for prompt delivery and little tonnage is on mill books beyond March 1. There is every indication that a large demand is coming and some pressure is being brought to bear on producers to contract for longer periods. Prices are not keeping up with quotations in the east on this product as the pressure is not as severe as it is nearer the seaboard, but it is believed considerable demand will come out shortly for iron bars to be used in places where soft steel bars are ordinarily employed.

The puddling mills of Lessig & Co., Pottstown, Pa., which have been idle for about a year, will resume within a few weeks.

(*For complete prices see page 362.*)

Scrap Drops Another Peg

Continued Freight Embargoes in the East and Congested Mill Yards in West Depress Prices—Firm in South

Chicago, Feb. 8.—Continued declines are being registered in scrap iron and steel at Chicago. Prices are easing off 25 cents to 50 cents at a time on many items, although the general level has not been reduced materially. Practically all deals now being made are for material to fill orders placed by consumers some time ago. But little new buying is under way and material is being delivered slowly as a congestion of shipments has existed at the mills of a number of larger consumers for some time.

Railroad lists now current contain considerable tonnage. The Southern railroad offers 3,600 tons; the Wabash, 3,500 tons; the Michigan Central 2,100 tons; the Chicago, Milwaukee & St. Paul, 2,500 tons, which includes 1,000 tons of cast iron wheels and 300 tons of No. 1 wrought; the Illinois Central, 1,050 tons and the Union Pacific, 1,500 tons.

Scrap Declines in Cincinnati

Cincinnati, Feb. 8. — The iron and steel scrap market has declined for the first time in six months. Quotations on all old materials carried by local dealers are from 25 to 50 cents per ton below those that prevailed last week. This weakness arises from an accumulation of scrap throughout the country and stocks in dealers' yards are increasing. Consumption does not appear to be falling off, but jobbing foundries are buying very little and rolling mills still have large tonnages to ship on old contracts. Heavy melting scrap is now quoted at from $14 to $14.25 per gross ton, and No. 1 busheling and mixed cast at from $10 to $10.50 each per net ton.

Cleveland Market Stationary

Cleveland, Feb. 8.—There has been little or no change in prices in the Cleveland scrap market during the week. The lack of buying on the part of mills and continued embargoes by the Lake Erie and Empire interests have had the tendency to keep the market quiet. There is a good supply of material available and since the recent heavy purchases of Corrigan-McKinney & Co., the market has exhibited a weaker tendency although no instances can be found of price shading. Some dealers report an unexpected movement of scrap from the Chicago district into Cleveland territory, but local conditions are not believed to be dependent upon these shipments. Heavy melting steel is quoted at $16.25 to $16.75, gross tons, unchanged from last week.

Scrap Quiet, But Prices Hold

Pittsburgh, Feb. 8.—The iron and steel scrap market in western Pennsylvania shows no signs of immediate activity. Specifications have been coming out in good volume, but no new buying of consequence has been enjoyed for almost 60 days. Prices, however, have been held fairly well, and some material is commanding slightly above prevailing quotations of a month ago. Heavy melting steel, large stocks of which are being carried by more important consumers, is commanding from $17.50 to $18, delivered. Machine shop turnings, which are offered in large quantities by manufacturers of shrapnel and shells, have declined to $7 a ton. Low phosphorus scrap is selling at a spread from $20.50 to $21, the range representing the present position of bessemer pig iron.

Heavy Melting Steel is Firm

Buffalo, Feb. 8.—Dealers report a considerable volume of business in practically all lines during the past week. This activity has not resulted, so far, in any further advances in prices, although several sizeable sales of heavy melting steel were booked at the ruling maximum price of $17, Buffalo. A stiffening in the price of this commodity is expected by dealers who say there is a demand in sight that will continue for some time.

Embargoes Bear Prices

Philadelphia, Feb. 7.—A strong effect still is being exerted on the old material market in this territory by the freight embargoes which are in force against several important eastern Pennsylvania consuming centers and against New Haven railroad delivery points. These restrictions of the free play of supply and demand are causing a softening in some grades and apparently are holding back the market in others. Railroad wrought and wrought pipe are lower because the number of buyers is reduced by the embargoes. Cast scrap which has been active is not so brisk because the inability of New England foundries to take in material is throwing a greater supply on the market. Small sales still apply in heavy melting steel and the price usually is $16.50, delivered eastern Pennsylvania. Carloads were sold during the week at $16.75, delivered. Buyers in this district have made new offers of $17, delivered, for tonnage lots. There is some inquiry for plate shearings from a plate mill about to resume.

(For complete prices see page 362.)

Buyers Bear Market

New York, Feb. 8.—Buyers of old material, whose plants are not affected, as taking advantage of the more plentiful offerings in the market due to the freight embargoes and have been able to force down prices in certain grades. The market throughout, due to this influence, displays a sagging tendency, and the volume is lighter. Cast scrap, which has been one of the most active grades recently, shows less vigor.

Better Tone in the South

Birmingham, Feb. 7. — Dealers in old material report a better tone to the market. Inquiries are more numerous and the resultant volume of business is considerably improved. With low grade pig iron ranging in price from $13.50 to $14.50 per ton at the furnace it is not reasonable to suppose that it will be given preference over strictly good No. 1 machine cast scrap at $11 or even $11.50 to $12.50 per ton. It is only a question of time until the pig iron situation works itself around to the point where scrap will be taken in lieu of the lower grades by the ordinary job foundries. The demand for steel scrap has picked up.

Embargoes Hamper

St. Louis, Feb. 8.—The scrap iron market is listless, due to the embargoes still in force, which have apparently tied up shipments consigned to consumers in this district. The fact that shipments to eastern markets also have virtually ceased, owing to embargoes, has tended to further depress the market. These conditions are only temporary, however, and dealers look for an advancing market early in February.

Retiring directors of the Central Steel Co., Massillon, O., were re-elected at the annual meeting of stockholders last week. Officers also were re-elected as follows President, R. E. Bebb; vice president, F. J. Griffiths: secretary and treasurer, C. E. Stuart. Mr. Bebb, as recently noted, succeeded John C. Neale, who a short time ago resigned to become general sales manager of the Midvale Steel & Ordnance Co. Directors of the Central Steel Co. include the foregoing and H. M. Geiger, of the Geiger-Jones Co., underwriter of industrial securities.

Foreigners Ask for Sheets

Heavy European Inquiries Received in the East—Prices Are Irregular in Chicago District

Philadelphia, Feb. 7.—Heavy inquiry for sheets for export have come into prominence in the eastern market the past week. These have aggregated some thousands of tons and the lighter gages have been sought. France has inquired heavily. J. G. White & Co., of New York, have inquired for 5,000 tons of galvanized sheets, which it is thought are for shipment abroad. Eastern makers of sheets have not been pursuing these foreign inquiries because they are sold up so far ahead and seem unable to supply the domestic demand. Some new contracts are being made for specification during the second quarter, but for delivery as the mill is able. These are being closed at from 2.80c to 3.00c, Pittsburgh, or 2.959c to 3.159c, Philadelphia, for No. 10 gage blue annealed.

Sheets are Active

Pittsburgh, Feb. 8.—Some manufacturers of steel sheets have been hampered considerably this month by the shortage of semi-finished steel, demand for which continues to increase steadily. The situation for sheet bars is so acute that several sheet mills have had to reduce operations in the last 10 days, being unable to obtain necessary requirements of steel. Open hearth steel sheet products are commanding about $2 a ton above the price of bessemer steel sheets. No. 28 gage black sheets are selling at 2.60c and above in this district; reports of quotations at 2.50c are heard in the valleys. Blue annealed sheets are selling at as high as 2.75c in many instances. The situation for galvanized material continues irregular and uncertain, as a result of the abnormal conditions surrounding the market for spelter. Manufacturers of automobiles, electrical equipment and other lines, who had planned to increase production this year, are having considerable difficulty in obtaining necessary sheet requirements. Premium prices are being paid for sheets of special analysis.

Sheet Makers Squeezed

Youngstown, O., Feb. 8.—The broad demand for heavy sheets is resulting in a large production, but sheet mill operations in the valley are under the January average. Between spelter and steel, some makers are being pinched rather acutely and are not able to operate all their mills. Mills buying sheet bars say deliveries of steel are delayed for several months and they are having their hands full explaining to customers who can't understand why they are not getting deliveries on their sheet contracts. Galvanizing operations still are under 25 per cent of capacity. The demand is light and mills are taking only a few firm orders, usually with prices based on cost. Sheet makers producng their own sheet bars have more profitable outlets for material than sheet manufacture, and apparently are operating their sheet departments principally to keep their organizations intact and possibly to fill long time contracts.

The Youngstown district, long known as the center of the country's galvanized roofing trade, feels keenly the slump in the roofing business caused by the prohibitory prices for spelter. As a large proportion of the mills in this district are equipped for rolling roofing sizes, competition for business in these sizes of black sheets is exceedingly keen, and thus some unusually low prices, cost considered, continue to come out. The shading of quotations for black sheets has not disappeared, figures even lower than 2.50c for No. 28 gage black having occurred recently in isolated instances. Most makers continue to ask 2.60c for No. 28 gage. The market continues a question of gages and widths, however, and considerable business in the lighter gages and narrower widths has gone on the basis of 2.50c for No. 28 gage.

Blue annealed sheets continue to be quoted about 2.65c to 2.80c, with no signs of cessation in demand, either from the domestic trade or for export. At least two valley makers are preparing to enter this business on a larger scale, The Trumbull Steel Co. is preparing to install two jobbing mills and the Brier Hill Steel Co. one. Recent exports of sheets include several good-sized shipments to China, Japan and Asiatic islands. These shipments have been made via rail to Pacific ports.

Sheets Are Irregular

Chicago, Feb. 8.—Considerable irregularity exists in the market for black and galvanized sheets. Most sellers are quoting 2.94c, Chicago, for No. 28 gage black sheets and 4.94c, Chicago, for No. 28 gage galvanized sheets. In the face of these prices some makers who have a supply of sheet bars bought at former low levels are shading somewhat and taking most of the business. Concessions of $1 to $2 per ton are being made on much business, while other makers maintain the higher quotations steadily. Consumers are not besieging the market and conditions are quiet.

Spot Demand Heavy

Cincinnati, Feb. 8. — A heavy demand for spot sales and uncertainty regarding the future course of the sheet market have caused makers in this territory to become cautious and they will accept only very limited tonnages for contract delivery. Sheet bars can be sold to eastern users at profits as great as if they were turned into the finished product. Blue annealed sheets are not as strong as in surrounding districts, but they are out of proportion in comparison with black and galvanized grades. No. 10 blue annealed are quoted at from 2.65c to 2.70c; black No. 28 at from 2.60c to 2.70c, and galvanized No. 28 at from 4.85c to 5c, all Pittsburgh basis.

(For complete prices see page 362.)

Warehouse Prices

On Sheets Go Up in Chicago — Inquiry Good

Chicago, Feb. 8.—An advance of $3 per ton on No. 10 gage blue annealed sheets went into effect Feb. 8, the quotation rising from 2.80c to 2.95c, Chicago. Quotations on this product in St. Louis and St. Paul have been advanced an equivalent amount. Other steel products from store continue to be quoted at the levels prevailing last week, although finished steel from mills went up $2 per ton.

Shafting Prices High

Cleveland, Feb. 8.—Prices on warehouse goods remain unchanged. Business continues very active. The $5 advance on shafting announced by jobbers last week, brings this price to the highest level ever reached in Cleveland. The quotation is now 20 off list, against 25 off list prevailing previously.

Buffalo Advances Prices

Buffalo, Feb. 8.—Warehouse prices were advanced in Buffalo on Tuesday, following the recent raises in mill prices of finished material. The warehouse quotations have gone up $2 per ton, making the present price on bars and structural shapes, exclusive of rounds and squares 2 inches and over, 2.70c, Buffalo. On rounds and squares 2 inches and over the price is now 3.40c, while plates are being quoted at 3c flat, f. o. b. Buffalo. To these quotations an additional 5 cents per 100 pounds is added for store-door deliveries.

February is Quiet

In Structural Trade in East — Prices Firm

New York, Feb. 8. — February is proving a quiet month in the structural steel trade in this territory. Steel makers say the limited building tonnage is following the usual precedent for this month but that railroad work, which usually is active in February, is making only a very ordinary showing. Fabricators and structural steel interests unite in the statement that future prospects are good and that a liberal amount of tonnage is in the preparatory stage. Tonnage of plain material from this territory again is moving better to the mills. Prices are steady at 2c to 2.10c, Pittsburgh, or 2.169c to 2.269c, New York, on ordinary business, with 2.25c, Pittsburgh, being paid in some cases.

Shape Makers Sell Carefully

Philadelphia, Feb. 7.—Conservative sales policies are followed by makers of structural shapes, particularly those which are producers of a variety of other finished products. Some of them will not quote at all for shape business at present. At least one eastern maker of standard shapes is included in this policy, as it is anticipated higher prices will be forthcoming later and the steel is being put at present into more active and higher-priced lines. Other eastern Pennsylvania mills are selling at a minimum of 2.00c, Pittsburgh, to the larger trade and have practically placed their quotations for ordinary business at 2.10c, Pittsburgh, following the advance from 1.90c to 2.00c, Pittsburgh, made by the Carnegie Steel Co., Feb. 4. Some orders are being taken by eastern makers at 2.25c, mill, or Pittsburgh, depending whether the delivery point is east or west. Some further contracts for second quarter specification have been taken by eastern mills at 2.00c, Pittsburgh, with deliveries to follow sometime during the third quarter. Fabricated steel offerings in this district are a little heavier. Considerable inquiry for car shapes is current, including 4,000 tons for the Lenoir City, Tenn., builder and a good tonnage for the Pennsylvania railroad.

Shapes Now Two Cents

Pittsburgh, Feb. 8.—The Carnegie Steel Co., on Feb. 4, advanced its price of structural shapes $2 a ton to 2c for delivery at the convenience of the mill; independent manufacturers adopted the same figure as soon as it was publicly announced. Specifications for shapes are coming out heavily, although most manufacturers of hot rolled products have been able to catch up somewhat in deliveries by their refusal to book additional tonnage for future shipment. Fabricating shops are being driven at maximum capacity.

Shapes Are Advanced

Chicago, Feb. 8.—An advance of $2 a ton has been made on structural shapes, the present nominal quotation being 2.19c, Chicago mill. Prompt delivery commands a premium, but tonnage of this sort is difficult to obtain. Lettings in this district during the past week have been less than usual. A portion of the tonnage for additions to the Corwith plant of the Crane Co., Chicago, has been awarded the South Halsted Street Iron Works having obtained 1,900 tons. The total tonnage for work now under way is approximately 4,000 tons and figures are being taken on the remainder.

CONTRACTS AWARDED.

Parish & Bingham Co., Cleveland, factory addition, 700 tons, to the Riverside Bridge Co., Wheeling, W. Va.

Glidden Varnish Co., Cleveland, factory addition, 200 tons, to the American Bridge Co.

Goodyear Tire & Rubber Co., Akron, O., factory building, 2,500 tons, to the Burger Iron Works, Akron, O.

Coaling station for the Detroit-Edison Co., Detroit, Mich., 800 tons, awarded American Bridge Co.

Crane Co., addition to Corwith plant, Chicago, 1,900 tons, to South Halsted Street Iron Works.

Block & Kuhl building, Peoria, Ill., 550 tons, to Decatur Bridge Co.

City and county of San Francisco, Cal., one 220-foot span with three 40-foot girder approach spans for Hetch-Hetchy Reservoir railroad, Cal., 255 tons, to American Bridge Co.

City of Indianapolis, Ind., bridge over New Parry avenue, Indianapolis, Ind., 120 tons, to American Bridge Co.

Pier for the Pennsylvania railroad, Greenville, N. J., 2,000 tons, placed with an independent shop.

Another addition to the plant of the Baldwin Locomotive Works, Eddystone, Pa., 800 tons, awarded to an independent shop, thought to be the McClintic-Marshall Co. About 300 tons of similar work still pending.

CONTRACTS PENDING.

C. E. Mather loft, Juniper and Arch streets, Philadelphia, 600 tons, bids being taken.

Bridges for the Erie railroad, 300 tons, bids being taken.

Garage, Springfield, Mass., 800 tons, bids being taken.

Three bridges for the New York State barge canal, 500 tons, bids being taken.

Two bridges for the Baltimore & Ohio railroad, 300 tons, offered for bids, in addition to 200 tons, previously bid upon.

Pier shed for the City of New York at Forty-sixth street and Hudson river, originally reported as 2,000 tons, now is learned will require about 4,500 tons, bids to be taken Feb. 11.

Extensions to the plant of the Ford Motor Co., Detroit, Mich., will require from 30,000 to 50,000 tons of reinforced bars and structural material.

(For complete prices see page 362.)

Wire Not Up Yet

Price Remains Fixed, Although Trade is Active

Pittsburgh, Feb. 8.—Wire manufacturers, contrary to expectations, made no change in the price of wire products this week. The trade had believed that wire material would be put up $1 or $2 a ton, last Saturday. A year ago, wire nails were offered at $1.55 a keg, and some tonnage was sold at $1.50 a keg, or $14 a ton below the prevailing price. Mills are asking $2 a ton above current quotations for shipment after April 1. Generally, manufacturers are refusing to sell for delivery after July 1, although some consumers are reported to have made reservations for third quarter requirements at prices considerably above those offered for first quarter specifications. Representatives of entente nations are endeavoring to buy barb wire in the American market, but some large mills refuse to entertain these inquiries, because of the growing home demand.

Copper Wire Advances

New York, Feb. 8.—Leading producers of copper wire have been advancing their prices sharply to correspond with the rising market for virgin metal. One flat advance adopted late last week was $20 per ton, which was based on an accepted market of 27½ cents for copper bars for February delivery. There has been good new buying of steel wire at the last advance. China and Japan have been heavy buyers recently in this country of wire shearings, which have been marketed under the name of "wire shorts". Some thousands of tons of this material have been sold. It is not certain for what purpose this material is being purchased.

Pipe Mills Active

Mills Driven to the Limit—Prices are Buoyant

Pittsburgh, Feb. 8.—Heavier specifications for skelp reflect increased demand enjoyed by manufacturers of tubular goods. Iron and steel pipe mills are being driven at nearly maximum capacity. While no large single orders have been placed in the open market recently, yet specifications in the aggregate are decidedly heavy. Prevailing discount prices are being firmly maintained and some mills are refusing to book additional orders at current quotations, apparently prefering to await developments. Makers of iron and steel boiler tubes and seamless tubing are swamped with specifications.

Not Easy to Get Rails

Mills Are Not Encouraging Orders Due to Low Prices—Spikes May Go Up

New York, Feb. 8.—Rail business at $28, per ton, mill, for bessemer and at $30, mill, for open hearth, does not hold out great inducement to producers at the present time, as against other heavy finished lines, where the prices are from $10 to $25 a ton higher. While plates, shapes, bars and all other products have been going up steadily to record levels under the pressure of demand upon capacity, the standard rail prices have remained unaffected. This probably is one of the important reasons why the railroads have been experiencing greater difficulty in recent months in getting mill position for any large supplemental tonnages. It is known that in several instances, the larger mills accommodated some of the roads because they could not get the rails elsewhere. Certainly, the mills are not encouraging rail orders at this time. There have been some reports that certain roads had been seeking reservations against their probable 1917 requirements, but these are not confirmed.

Transit Companies Buying

In this city, the rapid transit companies are in the market for about 20,000 tons of contact and running rails. The New York Municipal railways ask 10,000 tons of 150-pound contact, and 3,000 tons of running rails. The Interborough Rapid Transit Co. is asking 6,500 tons of contact rails, which probably will go to the Buffalo mill. There is a moderate buying movement of girder rails. Some important new export inquiries have been put out. Bids on the 12,000 tons for the South African Railway & Harbor Co., upon which domestic mills submitted prices, went in at London this week. Russia, France and Italy remain in the market. Railroads also are inquiring for 50,000 tons of car steel.

The car market has had a quiet week. High steel prices, apparently, are holding back lettings. The New York Central is inquiring for 1,000 hoppers and it is reported, has a much larger number to place. The Southern Pacific will act this week on its inquiry for 4,500 to 5,000 cars.

The Baldwin Locomotive Works has received an additional order for 80 small locomotives for the French Government railways. The Denver & Salt Lake railroad has ordered six from the American Locomotive Co. and the Detroit Terminal railroad, three from the same builder.

Consider Higher Spike Prices

Pittsburgh, Feb. 8.—Manufacturers of railroad spikes seriously are considering another advance in prices, and it appears likely that standard spikes will be held at 2.35c, or $2 a ton above the present price, before the end of the week. Small spikes now are selling at as high as 2.50c. Manufacturers are supplementing contracts for rails placed the latter part of 1915. Heavy pressure for semi-finished and finished steel has made it impossible for some rail manufacturers to book additional tonnage for shipment this year.

Inquiries for Plates

Cleveland, Feb. 8.—The New York Central Lines have entered the market for 6,000 tons of plates for 150 locomotives.

Some Mills Forced to Stop

Scarcity of Semi-Finished Steel in Youngstown and Pittsburgh Districts Growing Acute—Slabs Sold for $66 Ton

Youngstown, O., Feb. 8. — The semi-finished steel situation is causing increased anxiety to some consumers, including certain valley sheet mills. At least one mill has been forced to curtail operations because of lack of bars of the right sizes, while another may shut down some of its mills rolling lighter gages, shortly. Consumers say that deliveries on some of their contracts are delayed three to four months. Excepting for the recent sale of over 3,000 tons of open hearth billets at $45, Youngstown mill, no large sale in the open market for prompt delivery has been noted. All kinds of prices are heard on small lots for immediate shipment, where buyers are spurred by necessity to meet any quotation made them. For instance, a small tonnage of ordinary soft steel slabs was sold at $66 a ton, maker's mill. This material has been obtainable as low as $10 a ton within the last year. However, the buyer wanted the steel and the order displaced so much shell steel at corresponding prices, so the producer felt warranted in asking this high figure. Most consumers seem to have arranged for their second quarter contracts for material at prices ranging from $32 to $35 a gross ton. This refers to regular customers covered as to tonnage under long-term agreements but who must arrange prices from quarter to quarter. First quarter prices ranged from $26 to $30.

Insist on Future Contracts

Philadelphia, Feb. 7.—Insistent demands are being made by some consumers upon eastern Pennsylvania sellers of semi-finished steel that they be accorded a position on mill books at this time regardless of the extended delivery that only can be promised. The result is that several first and second quarter contracts for good tonnages of billets have been closed by eastern Pennsylvania makers with no guarantees of delivery, but on the stipulation that specifications be filed within the period of the contract. The prices have ranged from $42 to $45, mill, for open hearth re-rolling and from $55 to $60, mill, for forging billets. Two important eastern buyers now are in the market for about 25,000 tons for first and second quarter contracts. A new company which is to operate an old plate mill at Pottstown, Pa., is inquiring for 1,000 tons of slabs. The Cumberland, Md., tin plate maker remains in the market for 9,000 tons of first half sheet bars. Eastern makers as a rule do not care for additional semi-finished steel business at this time, as they can offer practically nothing before July 1.

(*For complete prices see page 362.*)

Spikes Advanced

Pittsburgh, Feb. 9. (By wire.)—Standard railroad spikes have been advanced $2 a ton, to 2.35c, Pittsburgh. Smaller sizes have been put up from $2 to $3 a ton, 5/16 and 3/8-inch spikes now being quoted at 2.75c. The demand for material is heavy but no large single contracts have been placed recently.

W. R. Miller Co., house building, Pittsburgh, has been incorporated and will take over the business of the Forter-Miller Engineering Co., contracting engineers of Pittsburgh, designers and builders of furnaces and gas producers. Practically every executive of the former concern will be with the Miller company.

Earnings Are Big

Youngstown Sheet & Tube Co. Has a Profitable Year

Youngstown, O., Feb. 8.—Reports submitted at the annual meeting of the stockholders of the Youngstown Sheet & Tube Co. today show that 1915 was the best year in the company's history from the standpoint of earnings, while shipments were the largest on record. The attendance was the largest ever present at the company's annual meeting, more than 90 per cent of the stock being represented. No reference was made to the recent merger negotiations.

Following the meeting, President James A. Campbell stated that the pay roll for 1915 amounted to $6,603,677, compared with $6,754,348 in 1914. Pig iron produced in 1915 amounted to 711,507 tons, the four blast furnaces averaging 529 tons for each day in operation. With the completion of extensions now under construction the company will have a steel ingot capacity of 1,200,000 tons by July 1. It also will have a shipping capacity of 1,000,000 tons of finished products. It expects to be making its own coke in its by-product plant soon after May 1.

The retiring directors were re-elected at the meeting, with the exception that Hugh B. Wick will represent the Wick interests on the board, succeeding the late Henry Wick. Other directors are: James A. Campbell, E. L. Ford, H. G. Dalton, C. D. Hine, J. G. Butler Jr., H. H. Stambaugh, Robert Bentley, G. E. Day, J. L. Severance and Richard Garlick. The board will reorganize later.

While the Youngstown Sheet & Tube Co. publishes no statement of earnings, it is said that the company earned approximately $4,000,000 in 1915, which after dividends and liberal depreciation left approximately $2,000,000 transferred to surplus. Earnings thus were 19 per cent on the common stock.

Buy Cinder and Scale

Philadelphia, Feb. 7.—Usual first-of-the-year contracting by eastern Pennsylvania blast furnaces for mill cinder and puddling scale has been concluded at an advance of about $1.50 a ton over January, 1915. Mill cinder has brought from $3.50 to $3.75 per ton, delivered, against $2.00 to $2.25 a year ago, and puddling and heating scale $5 to $5.50 a ton against $3.50 to $4 in 1915. Sales have extended mainly for delivery throughout the present year and the expected tonnage closed has been the largest in many years because of the present scale of activity of eastern iron mills, and blast furnaces. The advanced iron market has enabled the blast furnaces to pay the higher prices. The years' contracting movement in mill cinder and puddling scale now having been practically concluded, the market appears a little easier on the occasional tonnages offered.

New Ore Dock

Witherbee, Sherman & Co. to Build on Lake Champlain

A contract which will give the east its first modern iron ore dock on an inland body of water has been awarded by Witherbee, Sherman & Co., Inc., leading Port Henry operators, to the New York State Dredging Co. The dock will be built on Lake Champlain, at Port Henry, N. Y., within a few miles of the Witherbee-Sherman company's principal mines at Mineville. The dock will be of steel and concrete construction, 1,000 feet long and 250 feet wide, and it will have a storage capacity of 350,000 tons. The cars will dump direct to the dock and the ore will be loaded into barges by a modern electrically-operated ore bridge equipped with clam-shell bucket.

The construction of this dock signalizes what it is believed will be the beginning of a new area for the Port Henry district, due to the building of the enlarged Champlain canal from Whitehall to Troy, which is scheduled for completion by Sept. 1, 1916. The canal will have a 12-foot stage, enabling the navigation of large-sized barges, and is expected to cut the present carrying charges from Port Henry to New York harbor from $1.10 to 50 cents, or less, a ton, with a corresponding reduction to eastern Pennsylvania furnaces, where the present rate is $1.60 a ton.

To prepare for the heavier shipping movement anticipated, Witherbee, Sherman & Co., Inc., are enlarging greatly their present mining operations and are opening new deposits in the Port Henry district and their capacity soon will be at the rate of about 1,500,000 tons of crude ore annually.

The Allis-Chalmers Mfg. Co., Milwaukee, has taken a contract for building and installing a 4,000,000-gallon pumping engine in the water works at Marshalltown, Ia.

The Perry Valley Forge, of Marysport, Pa., is about to resume operations after having been idle since 1907.

(*For complete prices see page 362.*)

Metal Markets

Are Strong—Spelter Inquiry Heavy—Aluminum High

New York, Feb. 8.—The metal markets during the week have manifested much strength, and prices generally have risen to at least some extent. The greatest strength is manifested in copper, which has quieted down somewhat after having enjoyed a big demand, from domestic and foreign consumers. Electrolytic for shipment to and including May now is quoted at 27c to 27.50c, delivered 30 days, the inside price applying to February. Shipment beyond May may be quoted at 26c, delivered 30 days, at which level there have been sales. The lake interests, after making sales of their best brands for April to June shipment at 27.25c, cash, have advanced their prices as follows: Best brands 27.50c, cash; ordinary lake 27.25c, cash; arsenical lake 27c, cash. On shipment prior to April, lake interests are disposing of small lots at around 28c, cash. The market on ordinary casting copper may be quoted at 24.75c to 25.25c, cash.

The spelter market is exceedingly firm; although there is considerable inquiry, business has been rather small the last few days due to the hesitancy of consumers in accepting prices asked by producers. Yesterday and today these asking prices showed a strong upward trend, and there were sales of prime western Tuesday at 16.50c, St. Louis, for second quarter, and 18.75c, St. Louis, for March. The market on prime western may be quoted as follows: Spot 19.12½c, St. Louis; February 18.87½c to 19c; March 18.62½c to 18.87½c; second quarter 16.50c to 16.62½c. The market on brass special spelter for prompt shipment is quoted at 21.25c, St. Louis.

The lead market is exceedingly strong. Inquiry from domestic consumers is somewhat improved. Greatest interest, however, now attaches to foreign inquiries, principally from Canada and Russia. The American Smelting & Refining Co. still asks 6.10c, New York, and 6.02½c, St. Louis; an advance was expected today but this did not materialize. The outside market is quoted at 6.10c to 6.20c, New York, and 6c to 6.05c, St. Louis.

The antimony market is exceedingly strong, by reason of great scarcity of supplies and a greatly improved demand. Prices have been advancing steadily, and another advance was declared today after the Canadian government concluded a large purchase of Wah Chang's W. C. C. Chinese antimony. This involved March arrival, and was done at a price equivalent to 37c to 37.50c, c. i. f., Montreal. The Canadian government continues to inquire for antimony and this additional business is expected to be placed shortly. The market on Wah Chang's W. C. C. brand is quoted as follows: Spot 44.50c to 45c, duty paid, New York; March and April shipment from China, buyer's option, 33.25c to 33.75c, in bond at New York. Other Chinese and Japanese brands are quoted at 44.50c, duty paid, for spot. Domestic antimony is quoted at 44c to 44.50c, New York, for spot.

The aluminum market has strengthened somewhat by reason of a better demand, mainly from abroad. The outside market on No. 1 ingots in carload lots now is quoted at 54c to 56c.

The tin market has been quiet all week, although a fair amount of business has been transacted every day. This has been scattered over the different months, from spot to May, inclusive. There also has been some business for June. The supply of spot now is ample; while there are plenty of sellers, they are not disposed to shade prices. The market is quoted as follows: Spot, 42.25c; February, 41c; March, 40.75c, etc.

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

W. H. Woodin, who has been elected president of the American Car & Foundry Co., succeeding Frederick H. Eaton, deceased, is a car builder by inheritance, his father and grandfather both having been leading figures in that industry. He received his training in the car building business in the same school in which Mr. Eaton was trained—the old Jackson & Woodin Mfg. Co., established by his grandfather in 1842 at Berwick, Pa. This was one of the companies amalgamated with the American Car & Foundry Co., when that company was organized in 1899.

Mr. Woodin was educated at Columbia University, School of Mines. He took employment in the Berwick plant and by stages marked his way through the various departments to positions of increased responsibility. In 1892, he was general superintendent of the Jackson & Woodin company, and continued in that position until 1895. From 1895 to 1899 he was vice president of the company. When the American Car & Foundry Co. was formed, in 1899, Mr. Woodin became district manager in charge of the Berwick, Pa., plant, which is the largest car building works in the country. Since 1902 he has been a director and assistant to president of the company, with headquarters in New York, having had general direction of its affairs under Mr. Eaton, as president.

John S. Hyde, president of the Bath Iron Works, Bath, Me., is critically ill at his home in that city.,

Hector McInnes K. C., Halifax, N. S., chief counsel of the Dominion Steel Corporation, has been elected a director of the company.

Leland G. Watkins, Berlin, Conn., who has been with the White Adding Machine Co., New Haven, Conn., two years, has been promoted to be its secretary.

George Foley, for seven years with the Montague Machine Co., Turners Falls, Mass., has resigned to accept the management of two large foundries in Gardner, Mass.

Alexander McNab, vice president of the Marine Specialties Co., Bridgeport, Conn., who recently went abroad on a business trip, has joined a French army corps. Being an inventor and an engineer his qualifications appealed to the French government in solving difficult engineering problems and he was secured as an associate in this branch of the service.

Mark Workman, president of the Dominion Steel Corporation, is visiting New York with the object of securing a first class expert to assume the direction of the company's operations.

A. W. Wheatley, vice president and general manager of the Canadian Locomotive Works, Kingston, is resigning his position to assume the presidency of the Lima Locomotive Co., Lima, Ohio.

W. H. WOODIN,
President American Car & Foundry Co.

H. E. Zimmerman, chief clerk of the order department of the Cambria Steel Co., Johnstown, Pa., has resigned to take charge of the order and shipping departments of Corrigan-McKinney & Co., Cleveland.

Albert F. Rockwell, president of the Bristol Brass Co., Bristol, Conn., who has been ill at New Haven, Conn., for several weeks, recently left for Havana, Cuba, accompanied by Mrs. Rockwell.

A. B. Davidson, Sydney, Australia, is making a visit to the machine tool plants of New England and will probably place some orders for machinery for the making of war munitions for the allies. He says the making of shells in Australia has been started only a short time in an important way, but it promises to be a large industry before long.

Herbert N. Davison, for seven years general secretary of the Worcester, Mass., chamber of commerce, has resigned to accept a position as business manager of the Worcester Nut Mfg. Co., a new corporation.

Maj. L. T. Hillman of the United States arsenal, Watertown, Mass., addressed the Worcester Polytechnic student branch of the American Society of Mechanical Engineers in Worcester, Mass., Feb. 4, on "Modern Ordnance, its Construction and Use."

Orville B. Denison has resigned his position with the Norton Co., Worcester, Mass., and has joined the engineering department of the Simplex Wire & Cable Co., Cambridge, Mass. He was formerly connected with the south works of the American Steel & Wire Co., Worcester.

Charles E. Hildreth, Worcester, Mass., manager of the National Machine Tool Builders' Association, represents that organization at the fourth annual meeting of the Chamber of Commerce of the United States, Washington, Feb. 8-10. Mr. Hildreth is vice president and treasurer of the Whitcomb-Blaisdell Machine Tool Co., Worcester.

James Gardner, Montreal, vice president of the Canada Foundries & Forgings, Ltd., was tendered a dinner by F. C. Billings at the Hartford club, Hartford, Conn., Feb. 3. In speaking at the dinner Mr. Gardner said that munitions plants in the United States have still more war contracts coming their way because Canadian factories and those abroad will not be able to handle all the orders.

T. Russell Robinson, statistical engineer for W. S. Barstow & Co., Inc., New York, was the speaker at a meeting of the American Society of Mechanical Engineers, held on Feb. 8 at the Engineering Societies' building, New York. The subject of Mr. Robinson's address was "Ways of Presenting Data for Executive Purposes". Graphical and other ways of presenting data on costs, performance of equipment, output, etc., in order to secure appropriations from directors or investments from financiers, were discussed in this paper.

Midvale is the Biggest Independent

Purchase of Holdings in Cambria Steel Co. Gives Total Annual Output of 2,350,000 Tons of Steel—Details on the Merger

OWNERSHIP and control of the Cambria Steel Co., which has been the subject of numerous negotiations during the past year, is finally to be vested in the Midvale Steel & Ordnance Co., under an agreement of sale reached several days ago and announced at Philadelphia, Feb. 7, by President Wm. E. Donner and his associates.

The announcement came as a surprise to steel and financial circles. It followed quickly on the heels of a statement by Kuhn, Loeb & Co. and other leading New York bankers that they had decided not to undertake the financing of the proposed merger of the Cambria Steel Co., the Youngstown Sheet & Tube Co. and the Lackawanna Steel Co. It is understood one of the important reasons why the bankers abandoned the plan is that conditions in the iron and steel industry had become so prosperous and earnings so large that no permanent financial basis for the combination could be arranged with safety at the present time.

The stock of the Cambria Steel Co. was to have gone into the proposed merger at $80 a share and options which were allowed to expire Jan. 31, were taken on a large block of shares by the interested parties. The Midvale company now buys in the stock at $81 a share. The official announcement of the sale by Mr. Donner, in which E. T. Stotesbury, the Philadelphia banker, and J. L. Replogle, former vice president of the company, who has been active in the merger plans, joined is as follows:

While it is true, as reported, that the negotiations for the combination of Cambria Steel with other steel companies has been abandoned, it is desirable that the stockholders should be advised immediately that other negotiations looking to the sale of the stock have practically been consummated at $81 per share in cash. It is expected that a formal announcement will be made very shortly.

Later, it was officially announced that the Midvale Steel & Ordnance Co. was the purchaser.

The Biggest Independent

The acquisition of the Cambria Steel Co. by the Midvale Steel & Ordnance Co. will make the latter by far the biggest independent steel company in the country. It will have an estimated annual output of about 1,715,000 tons of pig iron, about 2,350,000 tons of steel ingots and 1,900,000 tons of finished product. When the company was formed in October to take over by purchase the Midvale Steel Co., Philadelphia, the Worth Bros. Co., Coatesville, Pa., and the Remington Arms Co., of Eddystone, Pa., its capitalization was fixed at $100,000,000. Later it announced it had acquired the undeveloped iron ore deposits of the Buena Vista Iron Co., of Cuba, containing, it is estimated, 300,000,000 tons. The purchase of the Cambria Steel Co., at an aggregate price of $72,900,000, will greatly increase the holdings of the company and it is believed a new issue of stock will be made to increase the total capitalization to $200,000,000, or more.

The Cambria plants will add to the Midvale company eight blast furnaces, 26 open hearth furnaces, four bessemer converters, bar, structural, shape, plate, rail and wire mills, car building and axle plants, steamship lines on the Great Lakes and extensive iron ore properties on the Lake Superior ranges. The most important of the Cambria Steel Co.'s ore holdings is a half-interest in the great Mahoning mine on the Mesabi range, which had an output last year of 2,311,923 tons. It is thought that the Cambria ore properties were one of the principal inducements to its purchase, since the Midvale company manifestly has been intent upon increasing its ore holdings to balance off its manufacturing capacity. In its list of products, the Midvale Steel & Ordnance Co. now includes all the most important finished steel lines except sheets, tin plate and tubular goods. By the Cambria purchase, it adds merchant steel bars, structural shapes, wire, rails, axles, nuts, bolts and rivets, shafting and other lines, which it had not produced before. It also broadens its capacity by a car-building plant. All the Cambria Steel Co.'s manufacturing plants are located at or near Johnstown, Pa.

The Cambria Steel Co. was formed in 1898 with a capitalization of $50,000,000, to take a 99-year lease on the properties of the Cambria Iron Co., upon the $8,468,000 stock of which it guarantees an annual dividend of 4 per cent. In 1901, it was reincorporated and merged with the Conemaugh Steel Co. Of the original capitalization, $45,000,000 in stock is outstanding. The company has no bonds but guarantees a $3,703,000 issue of the Manufacturers' Water Co. A regular dividend rate of 5 per cent annually has been paid since 1909, with extras in 1910 and 1914. The company declared an extra dividend of 1 per cent out of last quarter earnings, in addition to the regular disbursement. It is reported the earnings in January were approximately $1,500,000.

Wm. E. Donner was made president of the company several years ago, succeeding the late Charles Price, who retired because of ill health. The Pennsylvania Railroad Co. held the control of the company for many years and in November, disposed of its 355,500 shares to Mr. Replogle and his associates and to Mr. Donner, at a reported price of 60. Mr. Replogle's syndicate took about 240,000 of these shares.

William E. Corey, former president of the United States Steel Corporation, is president of the Midvale Steel & Ordnance Co., which includes among its officers and directors A. C. Dinkey, former president of the Carnegie Steel Co.; W. B. Dickson, former vice president of the Steel Corporation and other prominent steel and financial men.

Taylor Issues Statement

New York, Feb. 8.—Moses Taylor, vice president of the Lackawanna Steel Co., has issued a statement regarding the abandonment of the plan to merge the Cambria Steel Co., the Youngstown Sheet & Tube Co., and the Lackawanna Steel Co. He says:

"Lackawanna people entered upon these negotiations several months ago in the belief that the merger would be of benefit to the company's stockholders.

"While the negotiations were pending, however, the company's business greatly increased, and the officers have been of the opinion for some time that more advantageous arrangements than those originally contemplated should be undertaken if possible.

"For this reason the company's officers are pleased at the breaking off of negotiations."

Coke Association

Central Western Producers Organize to Boost Sales

Chicago, Feb. 8.—Makers of by-product coke in central-western territory have formed an association known as the By-Product Coke Producers of America. Its purpose is to bring together leading by-product coke makers to assist in disseminating a broader appreciation of the value of this form of coke, particularly as a domestic fuel in competition with anthracite coal and to make easier mutual co-operation regarding economical methods of production and distribution.

It is not in any sense a trade organization as circumstances practically isolate each by-product plant in its own field with only a little competition in the zones where freight rates are nearly equal. The following officers have been elected:

President, J. D. Forrest, Citizens Gas Co., Indianapolis; vice president, W. H. Ball, Semet Solvay Co., Syracuse, N. Y.; secretary-treasurer, W. J. Lavelle, New England Coal & Coke Co., Boston. The directors include P. H. Woods, Laclede Gas Co., St. Louis; C. N. Turner, Milwaukee Coke & Gas Co., Milwaukee; C. J. Miller, Coal Products Mfg. Co., Aurora, Ill.; J. A. Ballard, Semet Solvay Coke Co., Detroit, Mich. The publicity committee consists of J. A. Galligan, chairman, Pickands, Brown & Co., Chicago; C. H. Jenkins, Domhoff & Joyce Co., Chicago; C. J. Miller, Aurora, Ill.; J. R. Shurz, Newark, N. J.; and W. J. Lavelle, Boston.

The membership is made up of the following: F. C. Atwell, Chicago; W. H. Ball, Chicago; J. A. Ballard, Detroit; D. S. Boynton, Chicago; G. E. Crosby Jr., Cincinnati; J. D. Forrest, Indianapolis; J. A. Galligan, Chicago; C. H. Jenkins, Chicago; W. J. Lavelle, Boston; J. L. Makemson, Chicago; C. J. Miller, Aurora, Ill.; H. L. Nickerson, Boston; E. J. Remick, Boston; John Sargeant, Cincinnati; J. R. Schurz, Newark, N. J.; A. E. Scherm, Cincinnati; M. H. Sherman, Chicago; C. N. Turner, Milwaukee; and P. H. Woods, St. Louis.

Big Canadian Shell Order

Ottawa, Ont., Feb. 8.—An order for 800,000 18-pounder shrapnel shells has just been received by the imperial munitions board from the British ministry of munitions. This is the first large order which has come to Canada since the present imperial munitions board succeeded the old shell committee, the board's energies having been directed chiefly toward hastening deliveries on orders placed some time ago. It is probable that the new orders will be allotted in the form of renewals to firms which are already engaged in the manufacture of these shells. The munitions industry in Canada has developed a greater capacity for turning out 18-pounder shells than for the manufacture of any other, and is well able to take care of the large order which has just been received.

Benzol May Rise

New York, Feb. 8—Prices for merchant benzol and other benzol products are on the verge of an advance since the shortage of offerings has grown quite acute. Practically no contract business now is being put through in benzol, tuluol and solvent naphtha, owing to the fact that the works are sold up to capacity for many months ahead. Sales continue to be made of occasional spot lots. It is practically impossible to obtain any sizeable quantities for shipment before the latter part of the present year. In tuluol, there is a trifle more spot offering than in benzol and solvent naphtha. Prices are unchanged but are largely nominal at 70 cents per gallon, at the maker's plant, for contract benzol and 80 cents for spot; at $4.50 per gallon, at maker's plant for contract tuluol and $5 per gallon for spot; at 40 to 45 cents per gallon, at the maker's plant, on contract solvent naphtha and 45 to 50 cents per gallon for spot. The sulphate of ammonia market remains steady, though demand is rather light. Prices are unchanged at $3.60 to $3.65 per 100 pounds, at seaboard.

Expect Big Earnings

Steel manufacturers who are familiar with conditions as they exist today are confident that net earnings of the United States Steel Corporation in the current quarter will reach $60,000,000 according to the *Wall Street Journal*. This would mean a surplus available for the common stock of more than $37,000,000, or nearly $7.50 a share. The prospective surplus for the current quarter alone would be sufficient to pay 5 per cent annually on the common for a period of 18 months. The Steel Corporation has sold its entire output for the first half of the current year, and it would seem that earnings for the second quarter would equal those for the first quarter. Thus the earnings for the first half would equal $15 a share. As the surplus for common the last quarter of 1915 was equal to approximately $5.08 a share, taking these earnings and the estimated earnings for the first half of 1916 there would be a surplus available for common of nearly $21 a share for the period Oct. 1, 1915, to July 1, 1916. This would cover 5 per cent annually on the common stock for a period of more than four years.

Six Boats Placed

New York, Feb. 9. (By wire.) — Norwegian shipping interests have placed six more boats with the Manitowoc Shipbuilding & Dry Dock Co., Manitowoc, Wis. This makes 20 to 25 boats placed by these interests with American yards. It is now reported they have taken control of ship yards in Delaware.

Sell for 1917

New York, Feb. 9. (By wire.)— Plates, shapes and bars for specific requirements in the first quarter of 1917 have been sold by some leading makers at 2.25c, Pittsburgh. The producers are under pressure with bookings still exceeding mill shipments. Some large buyers, in order to get a mill position, are placing open orders for fourth quarter, the prices to be fixed Sept. 1, 1916. One of these calls for 25,000 tons of heavy products. The Steel Corporation's unfilled tonnage tomorrow will show several hundred thousand tons increase. The expectation is expressed in high steel circles that February will be a month of heavy buying.

The headquarters of the Stupakoff Laboratories will be at 6364 Franktown avenue, Pittsburgh, during the erection of the firm's new quarters on Hamilton avenue, that city.

The plant of the John H. Dialogue Ship Building Co., Camden, N. J., has been sold for $362,000, according to the report of referee in bankruptcy Conrad Ott.

The United States Cast Iron Pipe & Foundry Co. has advanced the wages of its skilled and unskilled workmen at its Burlington, N. J., works, 15 per cent.

The tonnage men of the Alan Wood Iron & Steel Co., Conshohocken, Pa., have been granted 10 per cent increase in wages.

The Empire Steel & Iron Co. has advanced the wages of its employes at Catasauqua and Topton, Pa., 10 per cent.

Making Parts for Sewing Machines

THE MANUFACTURE of this type of machine involves the molding and casting of many unusually intricate pieces. This article describes in detail the practice followed by the King Sewing Machine Co. The molding machine plays a leading part in the production of these light and complicated castings

BY H. COLE ESTEP

AMONG the several great revolutionary inventions of the early nineteenth century that of the sewing machine was by no means the least important. Scarcely any other mechanical contrivance has had so far-reaching an effect on both our commercial and domestic activities. Furthermore, the two great men who were most vitally connected with its early development, Elias Howe and Isaac M. Singer, did their work so thoroughly that the fundamental principles of sewing machine design and construction became permanently fixed before their deaths. With the passage of years, however, many important details have been refined and simplified and the scope and capacity of the machines have become greatly augmented. In addition, the past two decades have witnessed tremendous changes in the methods of manufacture, with the result that the modern sewing machine factory is entirely different from its predecessor of 25 years ago. On account of this evolution, the demands on the foundry end of the business have become increasingly exacting. The modern sewing machine is sold at prices much lower than those prevailing a generation ago and the industry has been reduced to a highly standardized and keenly competitive basis, making it necessary to shave costs wherever possible. The foundry, therefore, is called upon to furnish castings which can be turned into finished parts at minimum expense. Continuously satisfactory results cannot be expected from automatic machine tools unless the castings are uniform both with respect to dimensions and hardness. Also, many hours can be saved in the machine shop by cutting down the amount of metal to be removed. It has been estimated that the average weight of typical sewing machine castings has been reduced 10 per cent in the last few years, simply by the elimination of unnecessary metal, resulting from the general adoption of machine molding, and by reductions in the thickness of the sections where strength is not a prime requisite.

In modern sewing machine foundries, therefore, we find the methods of production refined to an unusual degree. One of the most typical plants of this character is that operated by the King Sewing Machine Co., Buffalo, N. Y. The King shop is said to be one of the first in the country to employ molding machines and at the present time all of the important sewing machine parts are machine-molded. For several of the more difficult operations swing-head air squeezers are employed. In addition, plain squeezers and ordinary rock-over drop machines are utilized. Some of the smaller parts are at present molded in snap flasks at the bench. In addition to the molding, special attention has been given to the facilities for mixing, melting and handling

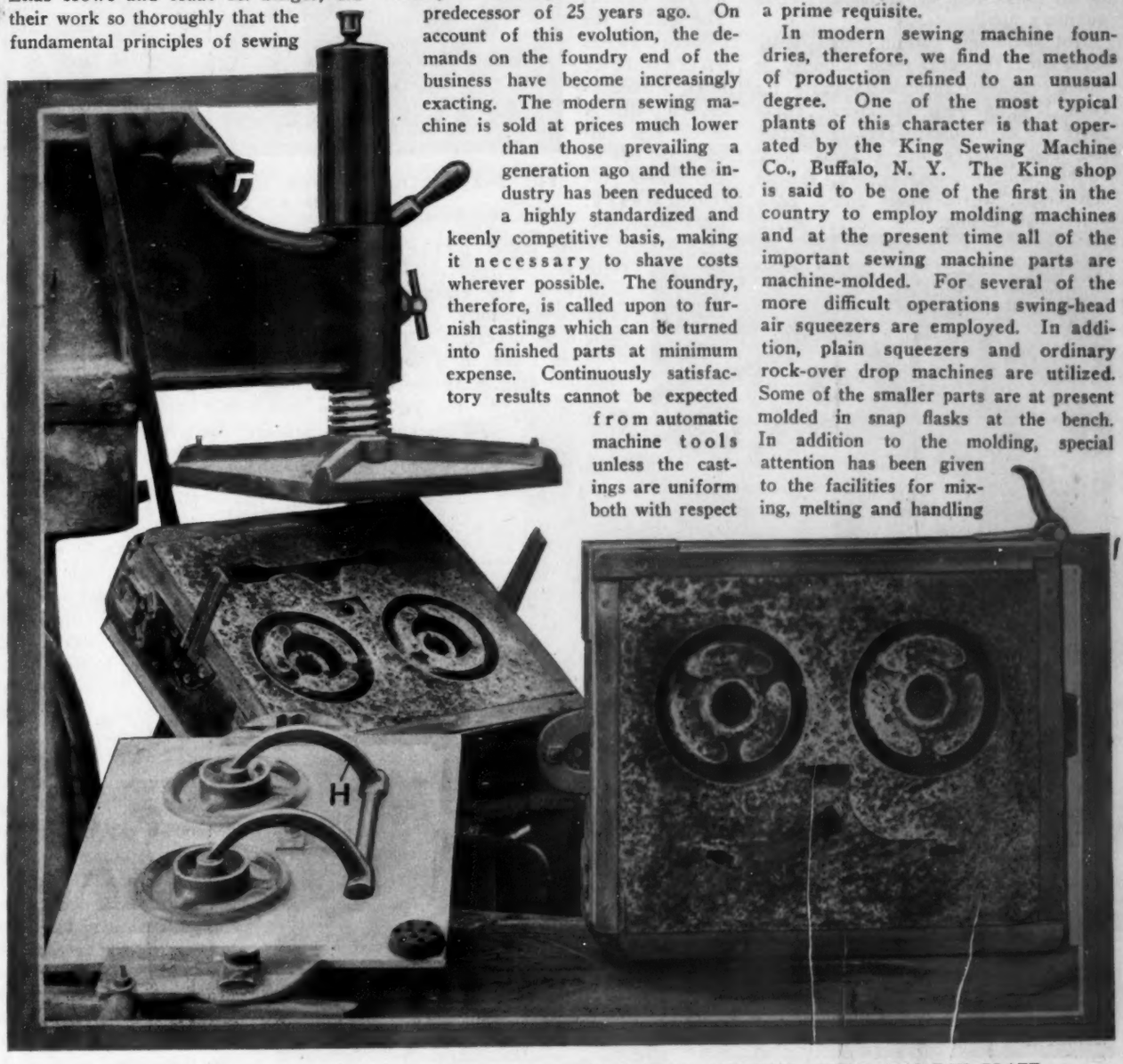


FIG. 1—THE BALANCE WHEELS ARE MOLDED ON A SWING HEAD SQUEEZER USING A MATCH PLATE PROVIDED WITH A HORN GATE

the iron and in this connection a special pouring device has been developed. The core room has received its full quota of attention and for many symmetrical parts, such as the arm, special cast iron core boxes, provided with brass separators, are employed. These boxes, which are used in connection with special cast iron core driers, permit the whole core to be made at one time, subsequent pasting operations being eliminated. The cleaning room methods also are interesting, special apparatus being employed to produce the high finish required on sewing machine castings.

The King Sewing Machine Co.'s foundry is in charge of F. G. Stewart, foundry superintendent. Mr. Stewart designed several of the molding machines employed in the shop, together with the pouring device, considerable of the core room apparatus and other auxiliary appliances.

Not including certain small bushings, etc., the gray iron foundry is called upon to furnish 15 parts for each King sewing machine. These parts are as follows: Treadle, treadle rod, bed, balance wheel, arms, legs, bobbin winder frame, guard, shuttle bell crank, worm wheel guard, back brace, ball casing, feed rocker shaft, arm rocker shaft and feed fork connection. It is the purpose of this article to cover the molding and casting of several of the most important of these parts.

The arm is molded on a special swing-head air squeezer machine that was designed by Mr. Stewart. The general construction of this machine is shown clearly in Fig. 2. The air cylinder, which is of ample dimensions, is bolted to a heavy cast iron bed plate, which is provided with lugs for carrying the four wheels on which the machine rests. The head of the machine swings on two long links, pivoted to the bed plate. A bench is provided at the left of the molder for holding flasks, small tools, etc.

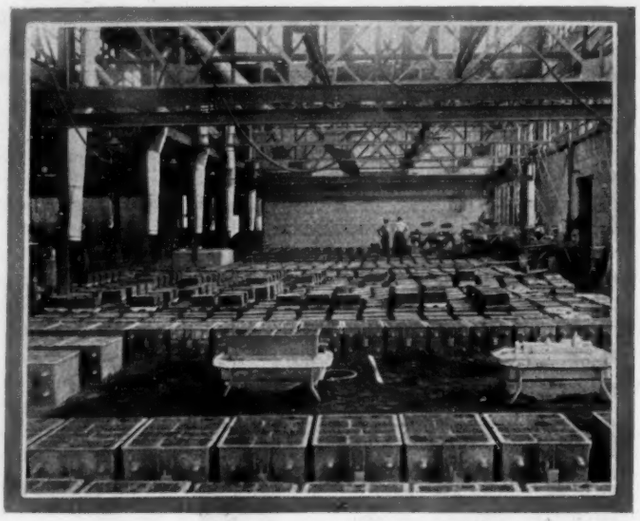


FIG. 3—A PORTION OF THE MOLDING FLOOR SHOWING FRESH AIR PIPES

A white metal pattern plate is employed and inasmuch as the casting is symmetrical, only a half pattern is necessary. The mold is made in a snap flask, the drag being shown at the right and the cope at the left in Fig. 2. The core may be seen resting on the top of the cope in this illustration, the pattern plate being plainly shown in the background. A single runner extends through the cope, terminating in a four-point star gate, which feeds the arm from its underside, as indicated in Fig. 2. No graphite facing is used, the mold being finished with talc, which has given good results. The casting weighs 10 pounds, finished, the metal sections having an average thickness of 3/16-inch. One man puts up 140 molds per day and the losses due to defective molding or careless pouring are said to be something under 3 per cent.

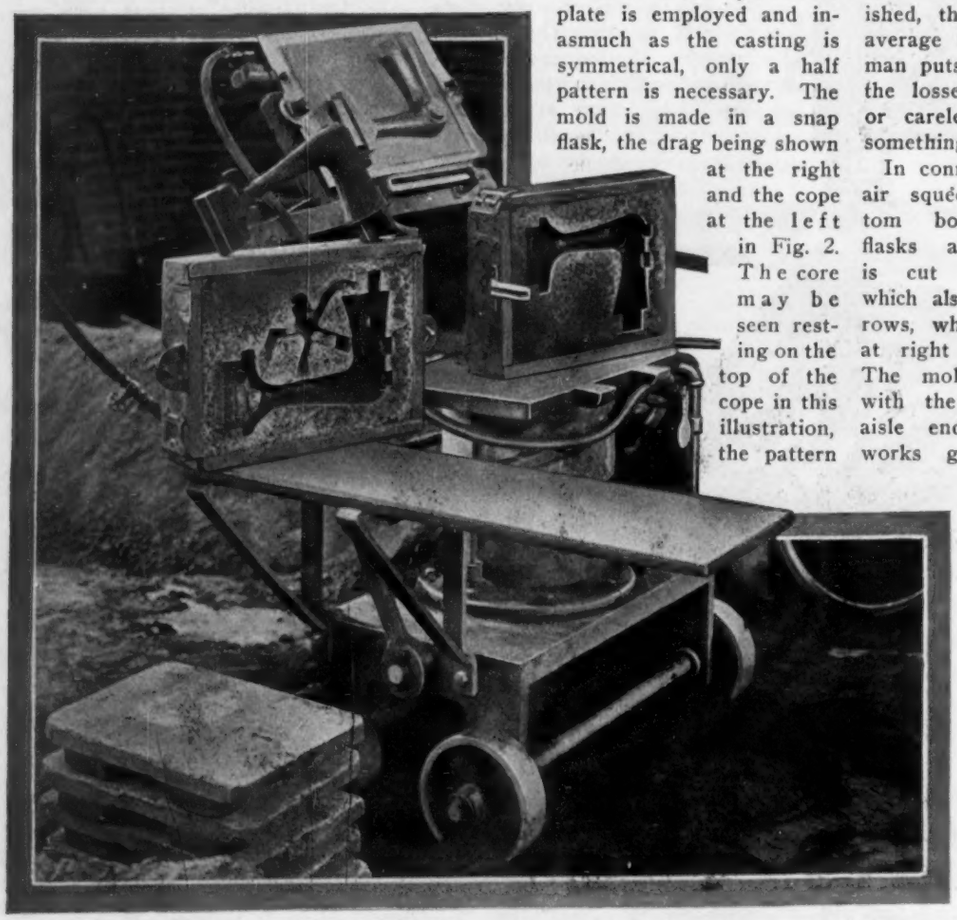


FIG. 2—FOR MOLDING ARMS A SPECIAL AIR SQUEEZER MACHINE HAS BEEN DEVELOPED

In connection with this swing-head air squeezer ordinary wooden bottom boards and hinged snap flasks are employed. The sand is cut over by a night gang which also piles it in heaps or windrows, which extend across the floor at right angles to the main aisle. The molder starts his day's work with the machine at the inner or aisle end of the sand heap and works gradually back toward the wall. The machine rolls on a paved strip and may be moved easily. An air pressure of 100 pounds per square inch is maintained. Fig. 8 shows the method of making the dry sand cores for the arm, using a special type of cast iron core box. In this illustration the two halves of the core box are shown at *A*, the core drier, which is also cast iron, is shown at *B*, and the special brass separator may be seen at *C*. A fairly heavy oil sand mix-

ture is used. In using this apparatus, both halves of the core are rammed up, the brass separator being fitted to one half of the box in order to provide an excess of about 1/16-inch of sand for the parting. After the two halves are struck off, suitable rods and wires being used to stay the core, the brass separator is removed and the core is booked without it, the excess sand at the parting forming a firm, homogeneous joint. In the final operation, one-half of the core box is removed and the drier substituted, after which the core is rolled over and the other half of the box is removed. The complete core, half of it resting in the drier, is then transferred to the oven and baked. Formerly the arm cores were made in halves and pasted together after baking. The latter operation has been entirely eliminated by the use of the separating shim and the production has been very materially increased. At present, one man working at a bench makes 170 good cores in a 9½-hour day. This is at the rate of 18 cores per hour, or approximately one core every 3½ minutes. No vent wax is used, the structure of the core itself being depended upon to carry away the gases properly. It will be noted in Fig. 2 and in Fig. 8 that the core has heavy prints at both ends, forming an ample area for the escape of gas. Many of the smaller symmetrical cores are made on the same principle, using a brass separating strip. In several of these cases only a half core box is employed, the drier taking the place of the other half of the box. The present method of molding the hand or balance wheels, utilizing a swing-head, air squeezer, manufactured by the Berkshire Mfg. Co., Cleveland, and a special horn gate match-plate, is shown in Fig. 1. This method is the result of several years' study and experiment. Formerly the balance wheels were molded four in a flask, with run gates. Considerable trouble was experienced from cold shuts and from the arms separating from the run. The adoption of machine molding did away with some of this trouble, but the main difficulty seemed to lie in the method of gating. It was finally decided that in order to get a satisfactory, clean, homogeneous metal it would be necessary to resort to a bottom-pour gate. However, in order not to cut down the production, it was essential that a gate suitable for use with a match-plate be designed. The hinged horn gate shown at *H*, Fig. 1, was the final result. The construction of the reverse side of the plate is indicated by the prints in the cope mold, shown at the right in Fig. 1. As this illustration indicates, the two horns are joined together on the back of the plate and are pivoted to a single hinge. The horns are circular in shape and if the two circles which they describe were completed, a cylinder would be defined. The hinge lies in the axis of this cylinder, thus making it possible to draw the gate from the sand properly.

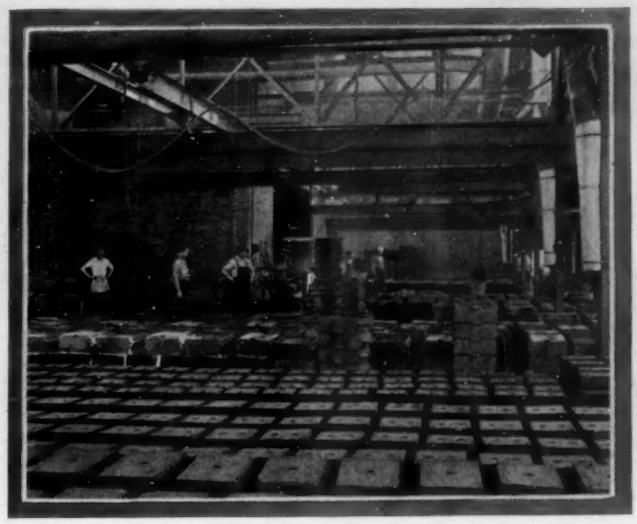


FIG. 4—ANOTHER SECTION OF THE MOLDING FLOOR

In making the mold, the drag, shown under the head of the machine in Fig. 1, is first filled with sand and the match-plate is then fitted to the flask pins with the horn gate extending down into the drag. The cope is next put in place, filled with sand and the mold is squeezed. After the head of the machine is swung out of the way, the cope is withdrawn and set off to one side, as shown at the right in Fig. 1. The horn gate

FIG. 5—THE LEGS ARE MOLDED ON A ROCK-OVER DROP MACHINE

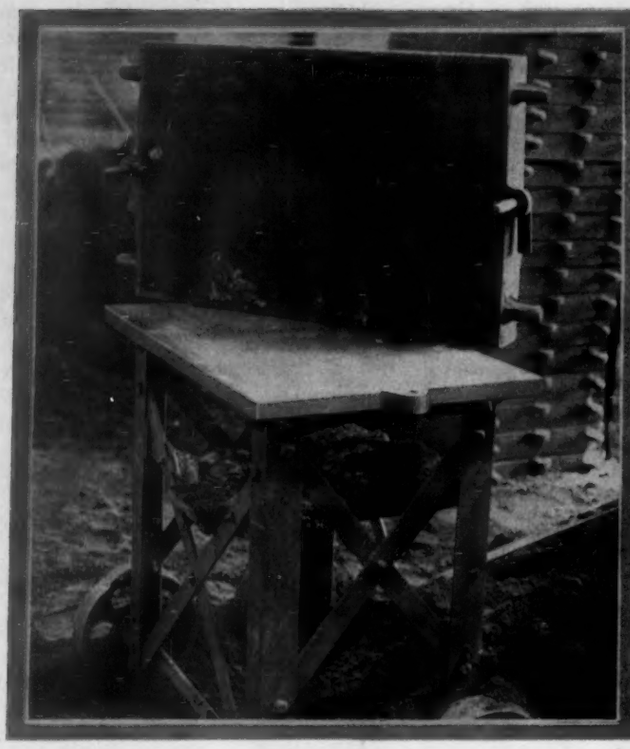


FIG. 6—CAST IRON COPE STAND FOR MOLDING LEGS

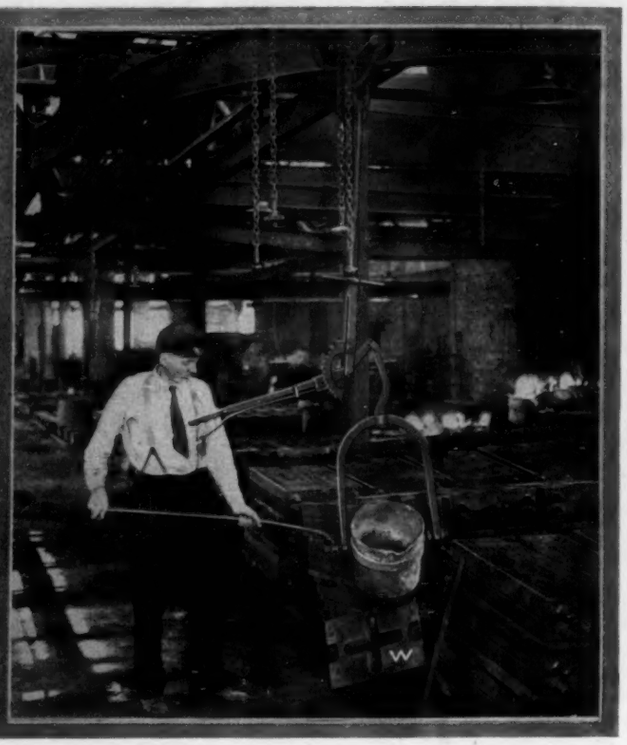


FIG. 7—SPECIAL POURING DEVICE, CARRYING 250 OR 500-POUND LADLES

is held in place by two buttons on the cope side of the plate. As soon as the cope is removed, these buttons are turned to one side, releasing the gate, which then is rolled back on the hinge. The horns have now been entirely removed from the drag. Therefore, there is no difficulty in removing the plate, the drag then appearing as illustrated in Fig. 1. Since this type of gate has been adopted, the losses have been reduced to less than 5 per cent, and with two balance wheels in a flask a molder turns out an average of 330 good castings per day. These castings weigh 3¼ pounds and, taking the sprues into account, it is necessary for the man to handle over 1,500 pounds of metal in pouring-off his floor. A 13 x 16¼-inch snap flask is used, both the cope and the drag being 3½ inches in depth. As shown in Fig. 1, the drag is fitted with extra long, machined flask pins to facilitate drawing the pattern. The pattern plate is white metal, the patterns themselves being brass. The horn gates are white metal and the plate is equipped with a pneumatic vibrator. In addition to the horn gate, a small dry sand strainer, shown on the lower right-hand corner of the match-

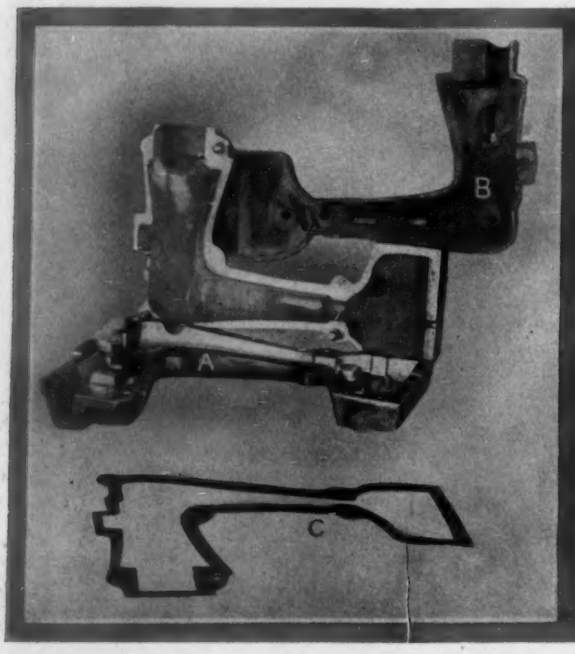


FIG. 8—CORE BOX, CORE DRIER AND SEPARATOR FOR MAKING ARM CORES

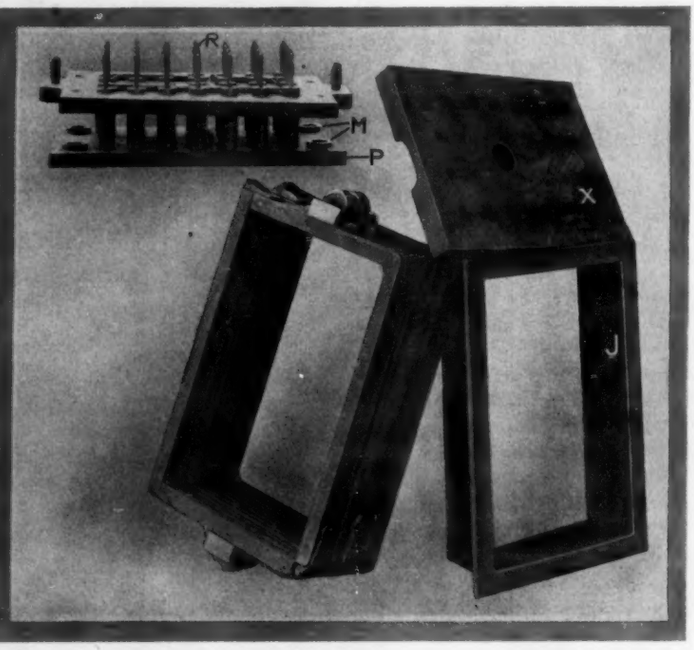


FIG. 9—SPECIAL STRIPPING PLATE RIG FOR MOLDING BUSHINGS

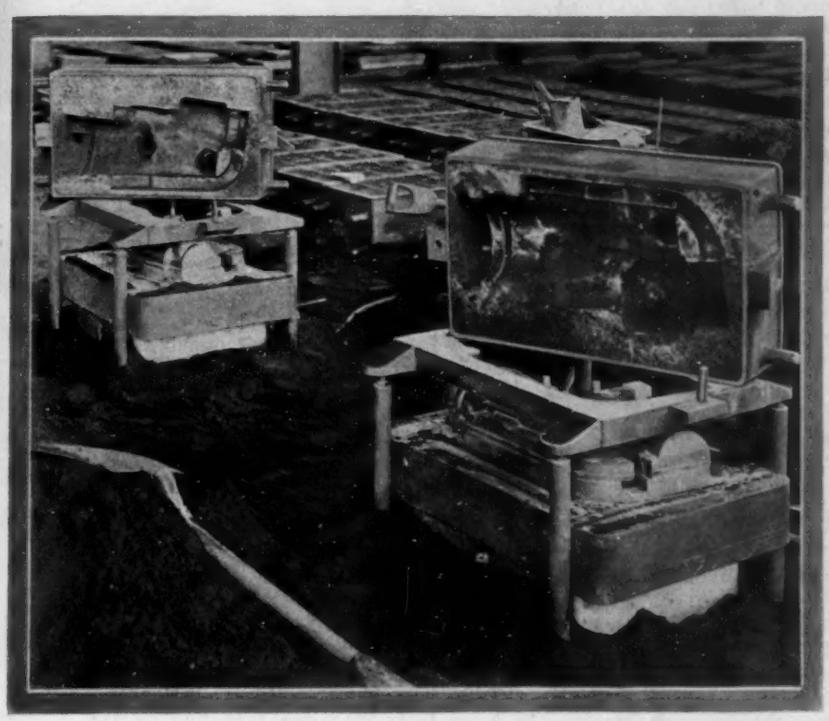


FIG. 10—JAR-RAM STRIPPING PLATE MACHINES MOLDING CREAM SEPARATOR FRAMES

plate, Fig. 1, is placed in the upper end of the runner to catch any slag or extraneous matter that might injure the metal in the casting.

For molding the legs, a rock-over drop machine, furnished by Henry E. Pridmore, Chicago, is utilized for making the drag, the copes being rammed on a stand of special design. Fig. 5 shows the drag mold and Fig. 6 the cope mold. In the former illustration, the pattern may be seen attached to the rock-over board of the machine. This job presents some difficulties, owing to the unusually thin sections employed and to the great area of metal exposed to the cooling action of the sand. The casting weighs only 10 pounds; its overall length, however, is approximately 28 inches, while the width at the bottom is 17 inches. A 19 x 32-inch cast iron flask is employed, both the cope and drag being 3¼ inches in depth. All of the mold is made in the drag, the cope simply forming a cover. The casting is poured through one runner at the upper end, the gate being shown at *G*, Fig. 5. It is claimed that the losses are less than 2 per cent.

The cope is rammed by hand on a stand, Fig. 6, which was designed in the King Sewing Machine Co.'s shop. It consists of a structural steel frame, carrying a machined, cast iron top. The top is provided with ears in which the flask pins fit. The stand is mounted on wheels, so that it can be moved along the sand heap as the work progresses. It is extremely substantial and has been found to be much more satisfactory than the wooden stands previously employed. It is believed that an iron stand will last practically indefinitely, whereas the wooden stands had to be renewed frequently.

Two floors are set aside for this job, six men being employed. The two molding machines and two cope stands each require one man and the remaining two men are employed in closing molds, handling flasks, etc. In order to save floor space the flasks are stacked three-high, as shown in Fig. 7. They are inclined slightly so that the metal enters the mold under a moderate head. Each mold is poured separately, the three flasks in each stack being arranged with their ends stepped, properly exposing the runners. The molds are poured successively, commencing at the bottom, using a special pouring device, Fig. 7, which will be described in greater detail later. A notched weight is placed over the runner on each flask to protect the sand at that point and the throat of the notch is oiled in order to prevent the hot iron from sticking to the weight. The weight of the mold is sufficient to eliminate the necessity for using clamps, but as an additional precaution, a 60-pound flat weight, shown at *W*, Fig. 7, is placed on each stack.

The six men previously mentioned, using two Pridmore rock-over drop machines and two cope stands, turn out an average of 425 molds per day. In pouring-off their floors, it is necessary, therefore, for them to handle over 6,500 pounds of metal.

An interesting example of one of those temporary expedients to which every foundryman occasionally is obliged to resort, is found in the method of molding back braces at the bench in a large snap flask. The job is shown in Fig. 12. The general characteristics of the casting are clearly indicated in this illustration. The match-plate is 15 inches wide and 26 inches long. This brace was recently redesigned and in its present enlarged form should be handled on a molding machine. Suitable machines and other

FIG. 11—THE CREAM SEPARATOR CORES ARE MOLDED ON SMALL ROCK-OVER MACHINES

equipment, however, were not available and it was necessary to get out a large number of castings in a short time. Therefore, a white metal match plate was made and fitted with roll-up hinges as in stove foundry practice. A 15 x 26-inch snap flask with a 2½-inch drag and 3½-inch cope was provided, together with a temporary bench.

Details of Cupola Charge on June 22.

Kind of Material.	Pounds per charge.	Total charged, pounds.	Per cent of total.
Susquehanna pig	1,000	9,000	25
Wickwire pig	1,000	9,000	25
Southern pig	400	3,600	10
Shop scrap	1,600	14,400	40
Total metal	4,000	36,000	100
Jamison coke, bed charge	.....	1,650	..
Jamison coke, regular charges	.....	3,010	..
Flux	.....	300	..
Total coke and flux	.....	4,960	..
Melting ratio	.....	1:7.75	

Results From Heat.

	Pounds.	Per cent.
Good castings	23,725	66.0
Bad castings	2,000	5.5
Sprues	5,600	15.5
Over iron	3,500	9.7
Cupola loss	1,175	3.3
Machine shop return	none	0.0
	36,000	100.0

Blast on 3:10 p. m.; blast off, 5:15 p. m. Elapsed time, 2 hours 5 minutes. Blast pressure, 9.5 ounces. Iron in 15 minutes after blast turned on. Average cost of metal, per net ton, $12.27.

The flask could not be hinged at the corners in the ordinary manner on account of the roll-up hinges. Therefore, the back was sawed in two and a couple of ordinary strap hinges were provided, as shown at the left in Fig. 12. Both the cope and the drag are equipped in this manner. The flask is locked together at the front corners and may be easily removed after the mold is made without disturbing the match-plate or the roll-up hinges. The match-plate is fitted with a pneumatic vibrator, which is said to be of considerable assistance in rolling the pattern out of the sand.

It also is believed, however, that a more accurate casting is produced than if the match-plate were rapped on the ears in the ordinary manner. This mold weighs 80 pounds, the casting, however, weighing only 4½ pounds. One man puts up a floor of 85 boxes in a day. The molds are poured in temporary wooden jackets. For all of the permanent snap flask work in the shop, heavy cast iron jackets have been provided.

Fig. 9 shows a special stripping plate equipment, designed for making small gray iron bushings of various sizes. With this rig, 28 bushings may be molded at one time, one man putting up 100 flasks per day, using a Berkshire machine. The flask is 12 x 18 inches and all of the mold is made in the cope, the drag simply forming a sand bed. Formerly these bushings were attached to a wooden pattern board and were molded horizontally, 12 in a flask. The adoption of the rig shown in Fig. 9, therefore, has increased the production from 1,200 to 2,800 bushings per day. When pouring, the cast iron jacket *J*, Fig. 9, which is similar to the other jackets used throughout the plant, is used. The mold is secured by the weight *X*. It will be noted that there are four rows of small holes in the weight, corresponding with the riser prints *R*. The riser prints are about ⅜-inch in diameter, one being attached to each bushing to insure sound metal. The several patterns are fixed to the base plate *P* and the length of the bushings may be varied by changing the four washers, *M*, which separate the base plate from the stripping plate. When thick washers are used, the bushings are short and *vice versa*, the maximum length of bushing being obtained when no washers are used; in the latter case the stripping plate rests directly on the base plate during the ramming operation. The bushings slide through removable rings or collars, which are fitted into the stripping plate.

On this account the diameter of the bushings may readily be changed simply by unscrewing the patterns from the base plate and substituting new models of a different size, at the same time changing the collars or rings in the stripping plate to correspond. These bushings are among the smallest pieces made in the King shop. None of the castings turned out, however, are very heavy, the average weight of all the work being only five pounds.

The treadles are molded on squeezer machines furnished by the Adams Co., Dubuque, Ia. They are put up in 13 x 24-inch snap flasks, the drags being 3 inches and the cope 4 inches in depth. One man makes 145 molds per day.

The band wheels, which are about 12 inches in diameter, are molded on match-plates and to simplify the molder's work all of the pattern except a portion of the rim is placed on one side of the plate. A horn gate similar to that used for the balance wheels, Fig. 1, is employed. The molds are made on Adams squeezer machines, one man turning out 210 per day. Besides sewing machine parts, the King factory turns out a large

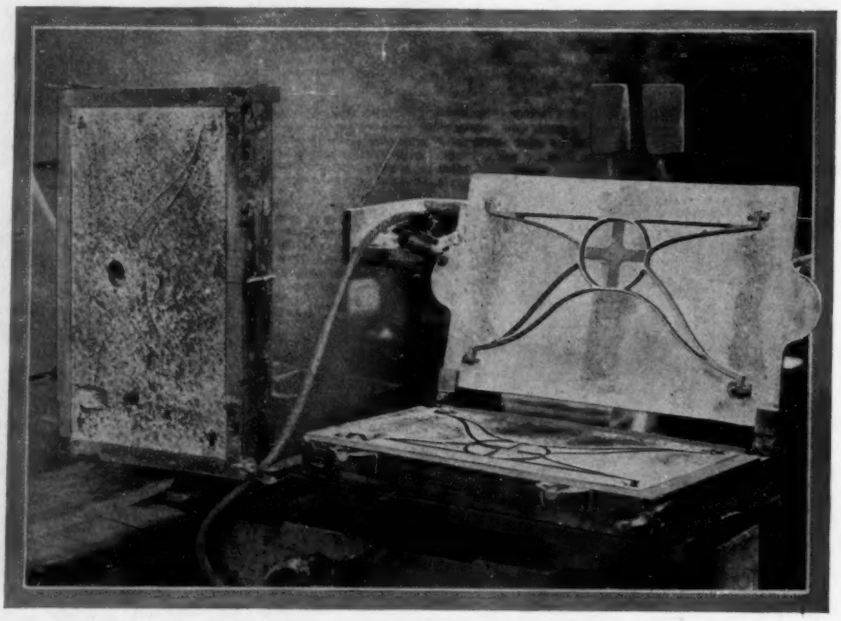


FIG. 12—SNAP FLASK RIG FOR MOLDING LARGE BACK BRACES

number of castings for cream separators. One of the most interesting jobs in this connection is shown in Figs. 10 and 11, Fig. 10 showing the principal features of the molding operation, and Fig. 11 the core work. This casting, called the separator frame, is made in a two-part cast iron flask, using a jar-ram, stripping plate machine of the Mumford type, built by the Mumford Molding Machine Co., Chicago. The flask is 15 inches wide and 26 inches long, the cope being 6 inches and the drag 7 inches in depth. The casting weighs 56 pounds and three men turn out 165 molds per day. The same gang puts up 190 molds from a somewhat smaller pattern. The casting is approximately symmetrical, the pattern being split through its long axis.

The cores are molded on Pridmore rock-over drop machines, as shown in Fig. 11. The core is made in halves and is baked and pasted together in the ordinary manner. The machines are operated in pairs, one working on each half of the core.

The same metal mixture is used both for the sewing machine and the cream separator parts. It is melted in a No. 7 Whiting cupola lined to 54 inches inside diameter. The cupola melts 350 pounds per minute, or approximately 10.8 net tons per hour, with a melting ratio of one pound of coke to eight pounds of iron. To satisfy the requirements of the machine shop, an extremely soft metal high in silicon is provided. The average analysis is as follows: Silicon, 3.10 per cent; phosphorus, 0.65-0.75 per cent; manganese, 0.55-0.65 per cent, and sulphur, under 0.07 per cent. The cupola is operated with a blast pressure of 9½ to 10 ounces per inch. To give a clearer idea of the cupola operation, a table, showing the details of the melt on June 22, 1915, is presented on page 350.

Over-Iron a Large Item

As this table indicates, the over-iron is a rather large item on account of the great number of light castings poured. Instead of pouring this metal into pigs, as is customary, the King Sewing Machine Co. is considering the possibility of utilizing it for sash weights. It is believed that this will be a more economical proposition than remelting the iron; also it will tend to keep down the sulphur in the mixture.

For distributing the metal throughout the shop, an I-beam trolley system, manufactured by the Curtis Pneumatic Machinery Co., St. Louis, has been installed. Where hand ladles are used, the iron is brought to the molder's floor in 250 or 500-pound trolley ladles. for reaching a few floors not equipped with the trolley system, 250-pound bull ladles are utilized. They are rested on horses while the metal is transferred to the hand ladles. For lining both the ladles and the cupola, a high-grade red New Jersey fire clay mixed with coarse New Jersey fire sand is utilized. In addition to the bull, trolley and hand ladles, the pouring device, shown in Fig. 7, is used. Its construction is clearly outlined in the illustration. It consists of a suitable trolley to which a suspension rod, leading to the ladle yoke, is attached. The suspension rod is provided with a turnbuckle, so that its length may be adjusted. The ladle yoke is carried by a ratchet lever which is used to adjust the ladle to the exact height required after the approximate height has been fixed by the turnbuckle. This device is used either with 250 or 500-pound ladies. It greatly increases the speed and capacity of the pouring gang.

The water for wetting down the sand heaps is kept in a large concrete tank located in the middle of the molding room. The roof of the molding room is of depressed bay construction, affording ample natural illumination. The shop is ventilated in summer and heated in winter by means of an air circulating system. The pipe or ducts carrying the fresh air are shown clearly in Fig. 3. The core room, which is provided with a six-section, five-drawer, Smith type oven, is similarly ventilated.

The cleaning room is equipped with six tumbling mills of various sizes, an automatic sand blast barrel and a sand blast room furnished by the W. W. Sly Mfg. Co., Cleveland. Six double grinding wheel stands are provided, together with pneumatic chipping hammers and other apparatus.

Foundries of the Early American Days

SOME time ago there appeared in several trade papers a history of the early American foundries, which, though interesting, did not seem quite complete and accurate. The writer has tried to get the most accurate information possible on the subject, and feels satisfied that it is as near the truth as records in possession of several historical societies warrant.

There are no records of founding in the earliest settlements, such as St. Augustine, Florida, 1565; Santa Fe, New Mexico, 1582; French settlements along the South Atlantic Coast, 1562-1564; Arcadia or Nova Scotia, 1605; Jamestown, 1607; Plymouth, 1620; New Amsterdam, 1623; the three jewels of the New World, Lynn, 1629; Boston, 1630; or Salem, the City of Witches, 1628.

Records in possession of the Lynn Historical Society show that in 1643 Samuel Hudson, of Lynn, Mass., either leased or granted a strip of land along the Saugus river, in the present town of Saugus, Mass., to Joseph Jenks, an English foundryman and blacksmith, to erect a shop to manufacture iron castings and forgings. The shop was erected in 1643 and the first job molded and cast consisted of a small kettle. It is now in the possession of the Lynn Historical Society, having been presented by Joseph Jenks to Samuel Hudson, and handed down to a descendant of Hudson, one John Hudson, who in turn presented the kettle to the society.

In 1647, Jenks built a forge in connection with his foundry and it is on record that he made an order for shackles for a gang of pirates who intended to use them in their trade, but the authorities used them on the *gentlemen* themselves.

In 1652 he cast the dies for the first silver money coined in New England, the patterns having been designed by Mrs. Jenks.

In 1654, Jenks made the first fire engine in America, said engine being made for the Boston authorities.

The foundry was located on the banks of the Saugus river and derived power from the water, as a fair-sized lake was situated only about one-eighth mile from the works. The iron used was bog iron, taken from the bogs near what is now the Newburyport Turnpike.

Taunton, Mass., put in a claim some years ago as having the site of the first American foundry. I believe the reason the Saugus Works have been overlooked was because the owners and operators, consisting of 20 men, were known as the Hammersmiths, and so confused with blacksmiths and forgemen. They were called Hammersmiths not because of their trade, but from the town they came from, Hammersmith, England.

The first foundry in Taunton started in 1653 and continued in business until 1860, making anchors for its last product. Branches of the old Taunton works were started in other places, but have all ceased business. Next in line as an early foundry center is the town of Carver, Mass.

"Safety First" and the Employer

THE ATTITUDE of the progressive employer toward accident prevention is characterized by the author, who describes the work of the National Safety Council. In the two years since its establishment, this organization has enrolled a membership of 1,600 employers and has effected noteworthy results

BY W. H. CAMERON

THERE was a time when workmen were expected to assume all the hazards of their work, and when employers, through insurance companies, paid as little as possible for accidental injuries or deaths. In one state, during those days, only seven deaths in the hundred were paid for. This condition has changed. In thirty states the people have declared that the financial burden should be borne by the industry. This meant a social and industrial revolution. By some it was predicted that the whole movement was a transient outburst of humanitarianism and that it would die out in the course of time, just as fashions in clothes changed. There were others, however, who had an overwhelming sense of the safety movement, and who realized that it spelled industrial efficiency and justice and was a symptom of progress in civilization. The census reports do not show the number of employers for or against workmen's compensation laws, or industrial safety measures, but a radical transformation in relation to this problem has brought about many and varying attitudes towards it. Interest in accident prevention is not new. For many years our government has been a leader in providing a measure of protection for mariners through the lighthouse and life saving services, the interstate commerce commission has ordered the use of certain safety appliances for railroad cars, and other agencies have contributed to the general movement. About twelve years ago, however, America began to realize that preventable industrial accidents were a national evil of appalling magnitude. The agitation for workmen's compensation laws brought forth astounding facts and figures. It was shown that both the number of accidents and the economic losses occasioned by them were increasing in a more rapid ratio than the output of our industries, but it was not until the extent of the evil became fully apparant that the safety campaign began. It was commonly assumed that the rapid increase in industrial accidents was inevitably caused by the growing use of power-driven machinery. This view has been shown to be far from the truth, because the majority of industrial accidents are not caused so much by machinery as by carelessness in its use—carelessness proven to be very largely preventable through extensive and thorough educational methods. The employe "took chances" and the employer expressed his attitude on the subject by the slogan, "Get out the work!" The man who received general approbation was the man who "did things," accidents being accepted as part of the price of success.

From a paper read at the annual meeting of the American Society of Mechanical Engineers, New York, Dec. 7 to 10, 1915.

The Law and the Employer

This attitude of mind was reflected in the state of the law, which held that while the employer was bound to carry on his work in a reasonably safe manner, in a reasonably safe place, with reasonably safe tools and reasonably safe workmen, reasonable safety did not require him to take undue precautions, the hazard being put on the workmen through those three archaic common law defenses, the fellow servant doctrine, acceptance of risk, and contributory negligence. In other words, the employer was not bound to abolish the danger spots even if they were vital to production, if they did not place him outside of the "reasonableness" test. The common law held that the employer was not under any obligation to provide guards, unless they were required by a special statute. The real cause of the acceptance and growth of accidents was the general and philosophical acceptance on the part of both employers and workmen that nearly all accidents were due to the "human equation" and an inevitable part of the business, and that it was impracticable to guard against or prevent them. There was no true appreciation of the causes of accidents, and, therefore, no logical plan put forward as a remedy.

The first step in accident prevention was to disprove this doctrine and to show that accidents were unnecessary. This could only be done by serious study of the causes of accidents, and a willingness to invest time, money and brains in remedial methods. Sentiment may make men anxious to abolish accidents, but "self interest" spurs them on to collect and classify accident statistics, to hire competent engineers to devise methods of accident prevention, and to spend a great deal of money in making these methods productive. Credit should be given, however, to the concurrent growth of a larger belief in the doctrine of fellowship; and feeling of responsibility for the welfare of their men on the part of a large number of employers has been a powerful adjunct to the force of necessity in bringing activity to a focus.

It was also feared that if machinery could be safeguarded, or changed in character, or operated at lower speed, the economic operation of industry would be interfered with. This, too, has happily been proven untrue, for good safety work has been found the partner and part of efficiency; for, being simply the study of the right and orderly way to do things, it has aided shop methods and economy in a very marked degree. Safety work has, therefore, evolved as a great constructive economic force in industry, as well as a social and humanitarian one.

The ultra-conservative type of employer is not yet awake to the modern methods of accomplishing results. He is often the man who has come up from the ranks, or the one who has inherited the established customs of his forefathers—the employer who feels that he only gets as much work out of a man as he can force out of him—that industry is a struggle between two men as to who will get "the best of the bargain." This type of employer has not taken kindly to the suggestion of his responsibility for safe methods of doing work in his shop. His attitude is that he owns the business,—that he has the exclusive privilege of directing it; and the suggestion that his foremen or workmen be asked to tell him where the dangers of the business may lie is obnoxious to him and wrong in

principle. The workmen's compensation law forces this type of employer to study more carefully the causes of accidents suffered by his employes, and because he has to pay the cost of the accidents, he may be converted and study the results secured by other employers through more humane measures. He will first have to learn to do business by the co-operative method, and if he wants to eliminate the excessive cost of accidents, he must realize that his employes should be recognized as having a part in the organized plan to eliminate accidents. He must be willing to educate his workmen in the right way of doing things, and to study their operation of the work in his shop from the standpoint of safety, and make his workmen understand that safety must be the first consideration.

A second group of employers may be said to occupy the "middle ground." These are the employers owning modernly constructed plants, well ventilated and illuminated and clean and orderly, and who take a moderate interest in the safeguarding of machinery, if it does not cost too much money, but who do not believe in "new-fangled notions." This employer is shocked by the horrible details of an accident, but considers himself to be a model of propriety in his own personal relationships. He would resent any insinuation that he was not vitally interested in the welfare of his employes. At the same time he is rather slow to accept new conditions—he believes in all the rights of the "boss." He is averse to publicity methods of accidents; he dislikes criticism or any intimation that there may be anything wrong with the operation of his plant. This applies particularly to certain employers whose businesses are not generally considered to be of an especially dangerous character. Employers in this group have not actively opposed workmen's compensation laws, but are apt to support associations who boost propaganda against radical legislation.

The attitude of the third group may be termed that of the progressive type—the pioneers in the accident prevention movement. The large employers of labor, the leaders in industrial life, and the employer who is himself working earnestly for the welfare of the race, are among those who have taken the lead in making an effort to solve the accident prevention problem. They are in favor of a fair and equitable workmen's compensation law. They have equipped their plants with sanitary toilets, locker facilities, modern washrooms and recreation centers, and do everything within their means to make their work places attractive and comfortable.

This class of employers asks safety engineers to review plans for new shop buildings from the standpoint of safety and comfortable working conditions, and urge co-operation by encouraging the men to work with them in establishing safe working practices, to eliminate as many of the hazards of the industry as may be possible. They carry on a vigorous educational campaign to teach the workmen the real causes and remedies for accidents. These are the employers who reduce accidents in their plants from 25 to 85 per cent, and whose efficiency account shows savings up to many million dollars per year. These employers unanimously declare that results securable from safety work are commensurate with the time and effort put into the task. One of them has recently stated that his investment for safety has brought a tangible return of 80 per cent.

The increase in insurance rates for protection from liability under workmen's compensation has brought about a revision in the methods of establishing premium rates, and now, through the so-called "merit rating system," this group of employers realizes the benefits of making their plants safe.

To summarize, from the anciently accepted attitude of indifferent or ignorant acquiescence in accidents has come an awakening, caused by publicity that has compelled a realization of the inhumanity and fearful economic waste of accidents, and the discovery and growing conviction that accidents are preventable. The employer has proceeded to prevent accidents, impelled by his humanitarian impulses, spurred by compensation laws that put the burden and responsibility on the industry and employer, and sweeping away the old outgrown customs and laws. The result has been a great and gratifying reduction of accidents through the mechanical safeguarding and education of workmen; the discovery that good safety work has been a big money saver over the old accident conditions; the discovery of the great constructive value of safety work, it proving to be a study of the proper way to accomplish manufacturing results and, therefore, a great aid to industrial efficiency and economy; with the resultant bringing of employer and employe together on a common ground of mutual interest, thus producing a fellowship and good feeling and co-operation in industry that nothing else could have succeeded in doing. When the history of the safety movement is written, a great deal of credit will be given to the employer. It has been due to his study and interest that the cause of accident prevention has grown to immense proportions in an amazingly short time.

Many illustrations could be cited to indicate the rapid and widespread development of the safety movement through the establishment of new businesses to provide such safety equipment as safety spectacles, safety devices, articles of clothing, etc., and the testimony of these salespeople is that their customers are well satisfied with the results secured through the use of such preventative devices. Generally speaking, however, the safeguard devised in the shop or factory where it is to be utilized is the most effective educational feature of safety work.

No better evidence could be given of the attitude of employers toward real interest in accident prevention than the development and growth of the National Safety Council. The council was organized by a group of representative employers as the result of a meeting held in Milwaukee in 1912. The headquarters of the council were not opened until October, 1913, but within a period of two years this organization has secured a membership of over 1,600 employers, representing 150 industries, included within which are 5,500 representatives located in every state of the union, except two, and in many foreign countries. These employers have voluntarily joined the council for the purpose of formulating information to promote the cause of accident prevention. Through the dissemination of the collective experience, a great deal of light has been thrown upon these problems. The National Safety Council has organized 23 active local councils, in various parts of the country from San Francisco to Boston. The fourth annual congress was attended by over 1,500 employers, or their representatives, and for attention and interest this meeting has rarely been excelled.

Some employers predict the most far-reaching effect from the safety organization plan, in bringing the employer and employe together into closer relationship, by obliterating the class feeling which has kept employer and employe apart. When both sit down at a safety meeting to discuss a problem of common interest, there is apt to grow up a better understanding of the aims and purposes of each party. If the employe has imagined in the past that the employer's indifference has been the cause of accidents, he soon learns that the remedy lies principally within himself.

New Semi-Thin-Lined Blast Furnace

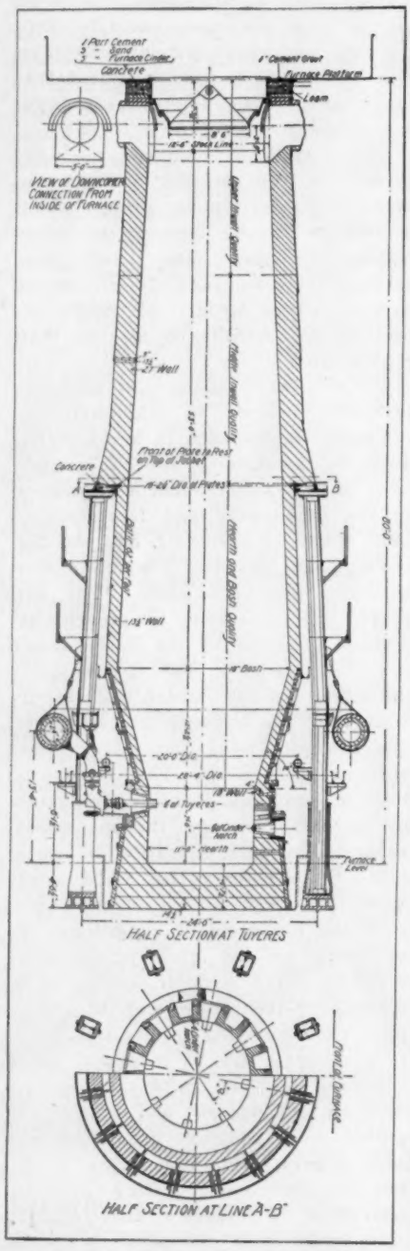
IN ORDER to maintain constant lines in the blast furnace interior, and to conserve heat, a modification of the thin-lined design, known as the semi-thin-lined type, has been evolved. This article describes a new installation of this kind, constructed at the works of the Robesonia Iron Co., Robesonia, Pa.

THE construction of thin-lined blast furnaces has recently been making considerable progress in this country, especially in the east, where a number of new units of this type have been provided in the past few years. The advantages claimed for this furnace design are the preservation of the interior lines of the stack, thereby reducing the possibility of hanging or slips, especially in the melting zone; a more perfect metallurgical condition contributing to a greater uniformity of product; a lower first cost; and the greater rapidity with which the furnace may be relined. Thin-lined furnaces are now in operation at the plants of the Eastern Steel Co., Pottstown, Pa.; and the Detroit Iron & Steel Co., Detroit. The Steel Corporation, in recent years, has given some study to the thin-lined and water-cooled furnaces widely used abroad, especially in Germany, and now has several in operation.

The necessity for maintaining constant lines in the furnace interior, as well as the considerations of heat economy, have evolved a modification of the thin-lined design, known as the semi-thin-lined type. This makes use of both thick and thin linings for certain parts of the inwall construction. The present furnace of the Northern Iron Co., Port Henry, N. Y., which was built several years ago, is of this type. The latest example of the semi-thin-lined furnace is the new stack of the Robesonia Iron Co., Robesonia, Pa., the lines of which are shown in the accompanying illustration.

The new stack is 80 feet high, with an 18-foot bosh, and an 11-foot hearth, and is 12 feet 6 inches in diameter at the stock line. Starting downward from a point 18 feet above the bosh line, the design parallels that of a thin-lined furnace. The inwall is 13½ inches thick from the level of the mantle to the upper bosh line, being 9 inches thick in the bosh proper. Upward from a point 18 feet above the bosh line, the inwall is 27 inches in thickness, to the top of the stack. The object of the combination design is to minimize, by means of a thick inwall, the radiation of heat in that portion of the furnace where the stock is in process of reduction, and to provide a thin lining in the lower half of the furnace, thereby maintaining true furnace lines.

The shell enclosing the thin portion of the inwall is of wrought steel, riveted to the mantle and extending downward to a point slightly below the bosh line, where a water trough is attached to it. The bosh jacket, tuyere jacket and hearth jacket are constructed of heavy cast iron sections containing extra heavy coil pipes, the various sections being secured in position by heavy links and bands. No connection is provided between the furnace shell and the top of the bosh jacket. Provision is made for a tight sliding fit by means of caulking strips.



CROSS SECTION OF FURNACE

No water cooling is provided above the mantle. In order to protect the inside of the mantle, cast-iron, water-cooled plates have been installed. Water sprays are provided for cooling the furnace between the mantle and the top of the bosh jacket, which is made in 16 sections, each with a separate water connection to its coils. This arrangement, which is intended to control the accumulation of dirt and kish on the bosh walls, has proved very desirable and effective. If, on restricting the water supply to any one section, the discharge water does not rapidly increase, it is evident that the bosh wall opposite the particular section is well covered with an accumulation of dirt and kish. Such being the case, the continued restriction or the closing of the water supply to the section soon results in the scouring and cleansing of the bosh wall. The tuyere and hearth jackets are cooled by the circulation of water through their coil pipes.

The stack is supported by wrought steel columns which rest on masonry bases. These steel columns are spaced 24 feet 6 inches apart, center to center. They are enclosed up to the tuyere level, or about 6 feet above the hearth level, with iron casings filled with concrete. The top of each column carries a steel slab, which, in turn, supports the mantle. From the mantle upward, a wrought steel shell extends; from this, the hopper is supported by brackets. The bell is 8 feet 6 inches in diameter. The furnace is equipped with eight tuyeres and one cinder notch. The center line of the latter is 3 feet 6 inches above the furnace level. The tuyeres are supplied by a bustle pipe of 24 inches inside and 43 inches outside diameter. Two platforms, supported by the columns, permit access to the furnace shell below the mantle. There are two downcomers, one leading to the stoves and the other to the boilers.

The furnace was built under the designs and supervision of Frank C. Roberts & Co., Philadelphia, engineers. S. B. Patterson is plant superintendent.

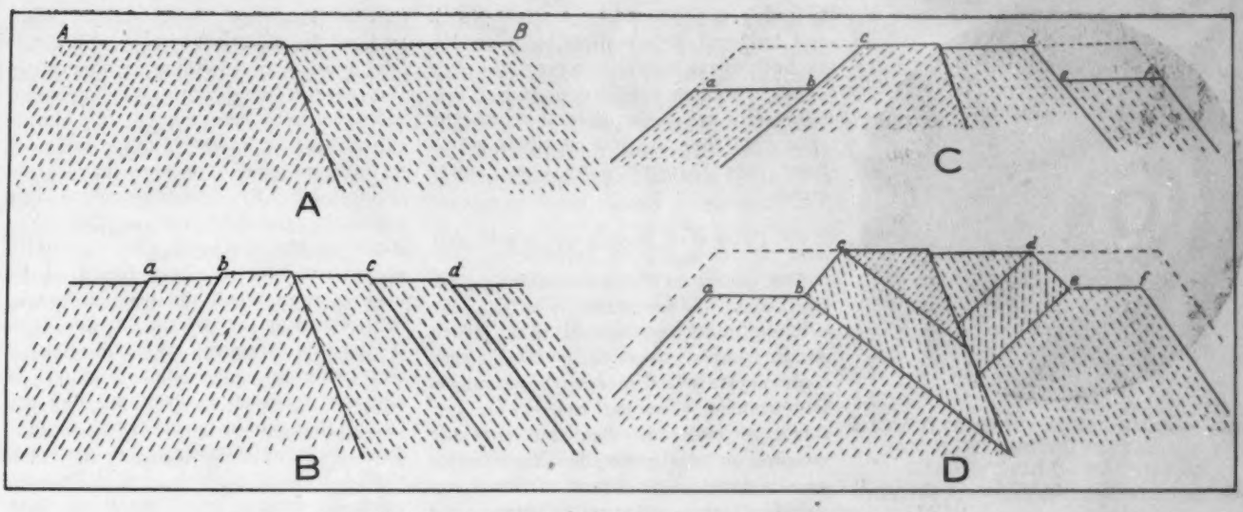


FIG. 1—CHARACTERISTICS OF CRYSTALLINE STRUCTURE IN METALS

A section of two crystals before straining is represented in *A*. The same structure is represented after straining in *B*, which shows slip bands *a*, *b*, *c* and *d*. Pronounced slipping, giving the same effects as twinning, which cannot be reproduced after polishing, is shown in *C*; *D* represents crystal twinning which gives the same surface stepping as in *C*, but in this case the optical characteristics can be reproduced after polishing below *a*, *b*, *e*, *f* and etching

Crystal Twinning by Direct Strain

EXTENSIVE investigations were made to determine whether structural changes of this kind can be produced without subjecting the mass to an annealing operation. An English experimenter concludes that acicular markings formed on tin and zinc are actually twin crystals and not mere surface appearances

BY C. A. EDWARDS

DURING the last few years considerable attention has been given to the question of crystal twinning in metals and metallic alloys, but there still appears to be some doubt as to whether structural changes of this kind can be produced in metals without subjecting the mass to some kind of annealing operation.

A paper read at the recent meeting of the British Institute of Metals.

FIG. 2—CAST TIN, UNDER AN OBLIQUE ILLUMINATION—SAMPLE HAS BEEN ETCHED AND MAGNIFIED 50 DIAMETERS

In discussing this extremely interesting subject and its bearing upon the hardening of metals, one authority says: "There is now good reason to doubt that mechanical twinning ever occurs in metals." The author had previously examined the acicular structures of the copper-aluminum Beta-constituent, which are obtained by quenching, and demonstrated that these markings are due to the presence of twin lamellae that have been directly brought into existence by quenching strains. Under such conditions of cooling, it seems highly improbable that anything in the nature of annealing can play an important role, especially when it is remembered that the more drastic the quenching the greater is the number of twin crystals which are formed inside the mass. Since, however, this is a matter of far-reaching theoretical significance, the author and a colleague were led to examine the behavior of pure metals while under strain at the ordinary atmospheric temperatures, and from the results obtained they concluded that tin, zinc and cadmium will give twin crystals immediately they are strained. The effect which is produced in tin is illustrated in Fig. 9. In all cases these lamellae give the same optical effect as twin crystals when the specimens are examined under oblique light, and rotated through an angle of about 180 degrees, that is, they may be made to appear black or white. This indicates that the angles of their surfaces or the orientations of their interiors are different from those of the original crystals. In discussing these results,

FIG. 3—CAST TIN OBLIQUELY ILLUMINATED AT A DIFFERENT ANGLE —ETCHED AND MAGNIFIED 50 DIAMETERS

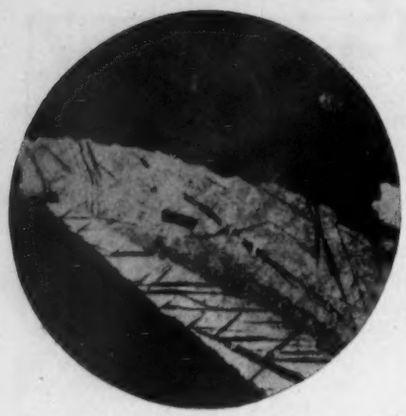


FIG. 4—SAME TIN AS IN FIGS. 2 AND 3 AFTER STRAINING

one scientist considered the evidence was inconclusive, and supplied photomicrographs in support of his disagreement, declaring that "the authors . . . must prove that twinning can occur at all in metals by direct straining. So far as tin is concerned, it undergoes spontaneous annealing at the ordinary temperature, and from my observations, it will be found that twinning in tin is due to recrystallization going on more or less simultaneously with the straining. On straining some cast tin, appearances are obtained that look at first sight like twinning, but, on straining far enough . . . the slip-bands pass through the black band of apparent twinning without the slightest change of direction, and prove that there has been no swinging around to the twinning position at all. When the section is repolished and etched afterwards, there is not a sign of the previous apparent twinning. The authors, therefore, appear to have been misled by a surface appearance, which is a good deal like twinning but is really not twinning."

Objections to Theory

It will thus be seen that two fundamental objections have been advanced for considering that the appearances under discussion do not correspond to twin crystals, and there is also suggestion that even if they are twins they are formed as a result of spontaneous annealing which follows the straining. It is interesting to note that a recent article on the subject concludes that the markings obtained in strained tin are twin crystals, and that the "tin cry" is caused by this twinning.

An investigator who has made many interesting experiments upon the structural changes that occur in zinc when subjected to cold-work, and its recrystallizing properties when annealed at different temperatures, found that twinning is produced by a slight shock and by local deformation by a needle. In both these cases, however, the evidence which is supplied does not satisfactorily meet the objections to the view that they are indeed twins which have been formed by mechanical strain.

To Determine Nature of Markings

The object of the present investigation was to determine whether the acicular markings which are formed on the surfaces of tin and zinc are twin crystals or merely appearances which do not extend below the surface. In order to facilitate the discussion, it will be advantageous to give a brief explanation of the manner in which a metal undergoes plastic deformation. It is believed that when a metal is strained beyond its yield point, deformation takes place by a process of slip upon the cleavage planes. This slipping is revealed upon

FIG. 5—SAME AS FIG. 4 AFTER GRINDING, POLISHING, AND ETCHING

the crystals of a previously polished specimen by a series of dark lines, which are practically straight and parallel in each individual crystal, but have varying directions in crystals possessing different orientations. In Fig. 1*a*, *A B* represents the polished surface of two crystals before straining. Fig. 1*b* shows the same crystals after straining. Slipping occurs upon the inclined cleavage planes, and the small steps *a*, *b*, *c*, *d* are formed. When examined under the microscope these steps appear as dark "slip-bands", because the light rays which fall upon them are not reflected to the eye-piece of the microscope. Unless direct evidence to the contrary can be obtained, it is quite conceivable that the markings in Fig. 9 may be due to a similar kind of slipping, but of a much more pronounced character, such as is shown in Fig. 1*c*. Steps of this kind could clearly be made to appear light or dark simply by rotating the specimen under oblique light, and, while this is the most characteristic feature of twinning in metals, in this case it would merely correspond to a surface appearance. A simple experiment is, however, quite sufficient to indicate that this view cannot be maintained. By drawing an ink line upon the polished surface and then straining the specimen, the continuity of such a line is never found to be broken, even when the acicular markings cross it, as would be the case if the appearances under discussion were due to pure slip. Further, if slipping occurred to anything like the extent that would be necessary to produce these appearances, the areas occupied by the crystals would be considerably larger after straining than they were before; but this is certainly not the case.

Methods of Testing

A much more crucial, and perhaps the only satisfactory, means of testing is to thoroughly remove all the markings from the surface by polishing, and then develop the structure again by etching. By grinding the surface *c d*, in Fig. 1*c*, down to or below the level of *a b* and *e f*, it will be seen that the optical effects of the surfaces *b c* and *a e* will be eliminated; and they cannot be reproduced by etching, because the interior of *b c* and *d e* are respectively of the same orientation as *a b* and *e f*. In the case of twin crystals the material corresponding to the stepping would possess a different orientation from that of the original crystals (see Fig. 1*d*), and grinding and polishing below *a b* and *e f*, followed by etching, would still reveal the twin lamellae. The application of this test and the solution of the problem would thus appear to be a comparatively simple

FIG. 6 — ABRUPT CHANGE IN DIRECTION OF SLIP BANDS AS THEY PASS THROUGH TWIN CYLINDERS FORMED BY STRAINING — MAGNIFIED 250 DIAMETERS

matter, but unexpected experimental difficulties were encountered, which made the work tedious and for a long time very unsatisfactory.

The specimens were all cast on perfectly smooth surfaces in order to obviate the preliminary difficulties in polishing. With suitable care almost any substance, such as a block of fire clay or compressed asbestos, will serve this purpose; but highly polished steel is perhaps the most reliable. When the metal is poured on these substances and allowed to solidify in the ordinary way, the artificially polished surface is somewhat irregular and usually contains many defects, such as casting pits. Considerably better results were obtained by casting the metal, while at a temperature only a little above its melting point, upon steel which has been heated to about 150 degrees Cent. and immediately applying a gentle pressure to the upper surface of the liquid by means of another piece of polished and heated steel. In this way almost all the casting defects were eliminated and specimens of any desired thickness were produced. The prepared specimens were then etched and examined for any twin crystals which might be present in the unstrained material. It was found that if the mass was seriously agitated during solidification twin crystals were often present, but such specimens were not used for further experiments.

Find Bending Strains Unsatisfactory

In the early stages of the investigation the straining was always produced by bending, but it was found that more consistent appearances were obtained by scratching the surface of the metal with the point of a needle or by giving a sharp knock on the edge of the specimen with a light hammer. When bending strains alone were used, the results were very disconcerting; sometimes the twinning

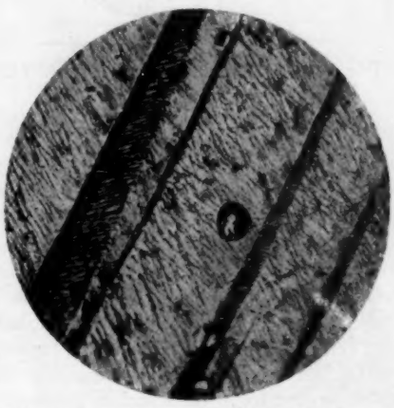


FIG. 7 — CHANGE IN DIRECTION OF SLIP BANDS CROSSING TWIN CRYSTALS

appearances were produced, while at others practically no signs of them could be observed. In the latter cases the only new feature caused by straining was what are generally regarded as slip-bands. In consequence of this, it was thought that, after all, the twin markings were purely accidental, and probably due to some irregularity in the composition of the metal, or possibly to an unknown variation in the method of casting. But, by taking more particular note of any slight difference in the treatment of the specimens, the cause of the rather perplexing appearance or non-appearance of the twin markings was discovered. It was found that when the surface for examination was bent in compression the twin markings were always formed, but when bent in tension they were almost entirely absent. In fact the author is inclined to the opinion that no broad twin markings would be

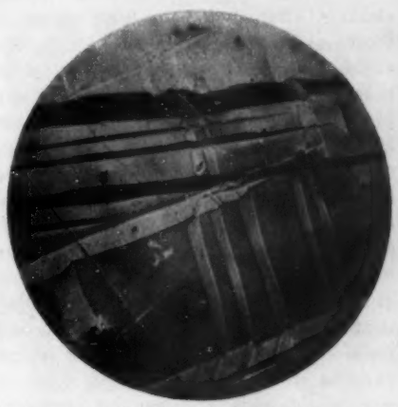


FIG. 8—MULTIPLE TWINNING IN TIN SHOWING CHANGE IN DIRECTION OF CERTAIN TWINS PASSING THROUGH OTHERS — UNETCHED AND MAGNIFIED 150 DIAMETERS

formed if pure tensional strains could be applied to tin crystals. The author is unable to decide whether the above facts indicate that the deformation of tin when strained in compression is fundamentally different from what occurs when it is bent in tension. The apparent difference may really be only one of degree, and the so-called slip-bands in tin may be of exactly the same internal formation as the twin markings. There does not appear to be any means of testing this. It will be seen that in order to decide whether these broad markings correspond to twin crystals or not, it is necessary to have three photomicrographs taken from the same area as follows:

1.—Unstrained and etched.
2.—With the acicular markings produced by straining.
3.—Same as No. 2 after polishing and etching.

No real trouble was experienced in obtaining the first two photographs,

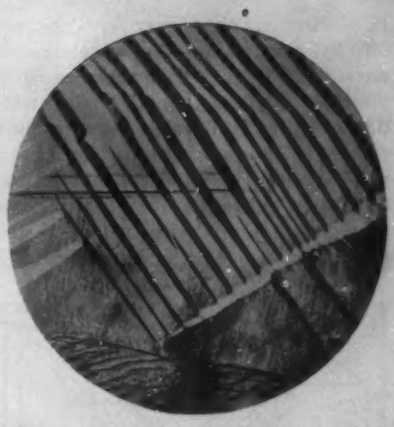


FIG. 9 — TWIN CRYSTALS AND SLIP BANDS IN STRAINED TIN — UNETCHED AND MAGNIFIED 150 DIAMETERS

but many experiments had to be made before reliable evidence could be obtained for the third. The markings in tin and zinc could be readily reproduced on etching, providing the specimens were polished on nothing coarser than chamois leather. This method was, however, open to the possible criticism that even prolonged polishing of this kind might not completely remove the surface effect of straining although the markings can be eliminated in this way. In fact anything short of the ordinary polishing on coarse emery and the like might legitimately be regarded as inconclusive. But it was found that a few seconds slight rubbing on 000 emery paper, followed by the usual final polishing and etching, gave a very confused and almost structureless appearance; the original crystal boundaries could be only imperfectly seen, and after using coarser papers no indications of a crystalline structure could be detected. Since, however, this was the only direction in which the matter could be permanently settled, the experiments were continued and the difficulties were ultimately overcome.

Make Several Trials

It scarcely seems necessary to describe the many trials that were made before the desired results were obtained. The essential fact is that the lightest rubbing on the finest emery has the effect of completely changing the structure of these metals for a considerable depth below the surface, and with coarse paper the thickness of this altered layer may reach about 1/16-inch. These cases are exaggerated examples of what occurs in the operation of polishing all metals. Owing to the presence of these unusually thick layers of broken up crystals or amorphous material, the normal structure cannot be seen under the microscope even after very strong etching.

If, however, the layer is dissolved off by immersing the specimen in strong acid and the surface again polished on chamois leather, the structure can then be developed by ordinary etching. By working in this way it was possible to obtain the evidence that was required to demonstrate that twin crystals are produced when tin and zinc are strained. Figs. 2, 3, 4 and 5 clearly illustrate this fact. Figs. 2 and 3 show the same area of unstrained tin taken under oblique light at different angles. Fig. 4 shows twin crystals in the same area after straining, and in Fig. 5 the same twin crystals are evident after very severe polishing.

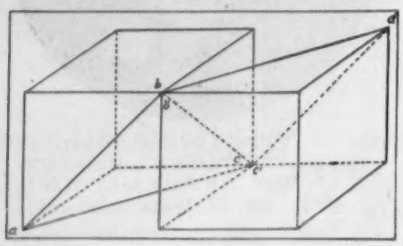


FIG. 10—SECTIONS OF TWO CRYSTALS AT THE SAME ORIENTATION—TWINNING PLANES SHOWN ALONG *a*, *b*, *c*, AND b^1, c^1 AND *d*

It may be noted that it is easy to decide whether enough metal has been dissolved from the surface by the strong acid, because until this has been done straight lines, or what seem to be scratches which were not present on the finally polished specimen, make their appearance after etching. Careful examination of these lines reveal the fact that most of them are not scratches, but are made up of large numbers of small twin crystals which have been formed by the scratching during polishing.

Show Change in Direction

Figs. 6 and 7, which show the abrupt change in direction of the so-called slip-bands as they pass through the markings under discussion, further prove that the latter are twin crystals. Fig. 8 is even more significant, because it shows a similar change in direction of certain twin crystals as they pass through other twins. It seems impossible to imagine how multiple twinning of this kind could be produced by a process of slip followed by annealing. Furthermore, the idea that they are formed by spontaneous annealing does not seem feasible, because they can be seen to form the moment straining takes place, and it is completely negatived by the fact that they are produced in greater abundance the lower the temperature of straining, that is, when there is less opportunity of annealing. Thus, for example, when tin is strained at 100 degrees Cent., practically no twins are formed, but at ordinary temperatures or at temperatures much below 0 degree Cent., very large numbers are developed. Hence the author considers that all the evidence available goes to prove that twin crystals can be formed in metals by direct mechanical strain.

Since the above was written there has been published valuable data relating to the softening or annealing of rolled tin after being kept for definite times at certain known temperatures. These figures, which are given below, indicate that spontaneous annealing occurs at ordinary atmospheric temperatures, and that there is a marked softening after 1½ hours at 14 degrees Cent. The lower limit of annealing appears to be somewhere near 0 degree Cent., for there is no change after half an hour at that temperature. The fact on which the author wishes to focus attention is that, if the twin crystals which are produced during the straining of tin are in any way connected with annealing, they ought not to be formed if the straining is conducted below 0 degree Cent. But this is not the case, for the author has found that large numbers of twin crystals are formed in specimens which have been cooled to the temperature of liquid air, and these can be observed with the naked eye the moment the metal is strained, and while it is still at the temperature of liquid air. The data on annealing follows:

	Hardness No.
Tin, cast	4.0 to 4.2
Tin, rolled at —25 deg. Cent. (ratio of thickness, 8 to 1)	13.0
The same, after 30 min. at —20 deg.	14.0
The same, after 30 min. at 0 deg.	13.0
The same, after 1½ hr. at 14 deg.	10.0 to 10.5
The same, after 20 hrs. at 13 deg.	6.5 to 6.6
The same, after 24 hrs. at 15 deg..	4.5
Tin, rolled at 15 deg.	9.5 to 10.0
The same after 97 days at the ordinary temperature	4.5
The same after 217 days at the ordinary temperature	4.2
Heated to 50 deg. and quenched..	8.6
Heated to 100 deg. and quenched.	5.2

Since it may be taken as proved that twin crystals can be formed in metals by direct mechanical strain, it becomes a matter of considerable interest to inquire into the mechanism of the change, and if possible determine whether it involves any alteration in the molecular constitution of the mass. Before doing so, however, it will be advisable to briefly describe some of the views which have been advanced to explain what occurs during plastic deformation of metals, and the cause of the increased hardness which usually accompanies such deformation at low temperatures. One writer considers that at all the internal surfaces of movement or slip the material becomes decrystallized, and these amorphous layers are harder than the crystalline substance from which they were formed. Another supports this view, and says that the amorphous phase is produced by the slipping which is illustrated in Figs. 1a and 1b. A third considers that deformation causes an increased number of crystalline lamellae, not accompanied by the destruction of the true crystalline arrangement. The hardening is regarded as due to the absorption of energy in forming these cleavage lamellae and twinning. Thus energy exists in the worked and hardened metal, in the form of increased solution pressure. It has also been suggested that twin lamellae are formed at every surface of slip in strained metals, and that straining simply distorts the space-lattices of the crystals. The above views may be very conveniently classified under two heads, as follows:

1.—Hardening by cold-work is due to the formation of amorphous layers at the surfaces of slip.

2.—Hardening is due to the increased solution pressure existing at the surfaces of cleavage lamellae and twin crystals.

The dissimilarities between these two groups are more apparent than real,

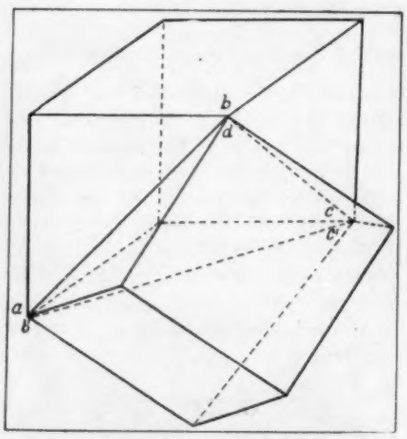


FIG. 11 — SAME AS FIG. 10 AFTER TWINNING OR ROTATION ON TWINNING PLANES

and in fact a little impartial thought will make it evident that they are essentially very much alike. In both cases the increased hardness must really be attributed to the increased kinetic energy at the disturbed surfaces. In one this energy is supposed to reside in the amorphous layers, while in the other it is supposed to exist in the form of solution pressure. It is, therefore, largely a question of the choice of words, and while objec-

tions have been made to the use of the term amorphous in this connection, it certainly possesses many advantages. Hence believing that the term amorphous virtually embraces the idea of solution pressure and distorted space-lattice, the author prefers to retain the use of that term.

There are many interesting examples of increased kinetic energy causing greater hardness. In the case of gases kept at a constant volume, the hardness, or in other words the pressure, is increased simply by heating, which increases the kinetic energy of the molecules. Another instance is the use of soft steel in circular saws for cutting much harder material. In both these cases the increased hardness is due to the greater number of molecules passing through a given space per unit of time. Whenever hardening occurs as a result of any special treatment, it is only necessary to demonstrate that pronounced crystal twinning has taken place. It is, however, necessary to show that sufficient internal movement has taken place to cause the formation of amorphous layers. These two points are bound together in the following question: Does crystal twinning involve internal movement of a kind which will produce the amorphous layers?

This question has often been answered in the negative; but perhaps the best instance is to be found in an interesting recent paper which de-

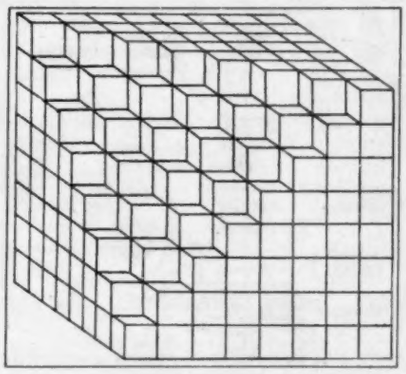


FIG. 12 — ANGULAR PROJECTIONS ON TWINNING PLANE

clares: "The amorphization of the metal, along the internal planes of which these manganese steel lines are the outcrop, testified to by the hardening, tallies with the belief that slip has occurred along them; but not with the belief that only twinning has occurred. For slip is naturally believed to cause such amorphization; whereas twinning is not, because it implies only rotation into a new orientation without crushing any crystalline matter."

It is quite true that twinning may be conveniently regarded as being due to rotation; but it certainly seems wrong to assume, as the above authors evidently do, that this rotation takes place with greater facility and with less crushing of the crystalline matter than is the case for ordinary slip. If we accept the view that slipping along the internal planes will produce the amorphous matter, then it must also be granted that rotation on twinning planes, which is another kind of slip, will have the same effect. It must not be supposed that twinning occurs spontaneously; energy is required to bring it about, and some of this is absorbed in maintaining the new positions of the lamellae because they are unstable. The degree of instability of the lamellae increases as their thickness decreases. If the movements involved in mechanical twinning of metallic crystals are examined, it will be seen that it is perfectly logical to consider that amorphous layers are produced on the twinning planes.

Fig. 10 represents two sections of cubic crystals at the same orientation. The surfaces *a*, *b*, *c* and b^1, c^1, *d* are the twinning planes upon which rotation or slipping occurs by the movement of b^1, *d* to *a*, *b*. After this movement the crystals are twinned, as is shown in Fig. 11. When twinning occurs in a mass of metallic crystals this rotation cannot proceed as easily as might be imagined from Figs. 10 and 11, because the twinning planes are not perfectly smooth, but consist of numerous rectangular projections, such as are illustrated in Fig. 12. As a result of these irregularities the rotation which occurs in twinning must cause a crushing or breaking up of the crystalline material on those surfaces.

Position of Units Altered

Further, the facts which have been observed in connection with the twinning of zinc and tin indicates that the rotation does not proceed *en masse* in such a simple manner as is illustrated in Fig. 13. The units which go to form twin lamellae cannot retain the same relative position to each other after twinning as they did before. This fact will no doubt be more readily appreciated after considering the illustration in Fig. 13. In which a number of crystal blocks *a*, *b*, *c*, *d*, *e*, *f*, are shown on one side of the twinning plane *x*, *y*, *z*; and three similar blocks *g*, *h*, *i*, at the base of the same plane. If *g*, *h*, *i* are considered to be part of the lamellae which undergoes rotation on the twin plane, then it will be seen that if *g* is rotated in the manner indicated in Fig. 11, and *h*, *i* retain the same relative position to *g*, the movement of *h* and *i* will be much greater than that of *g*, and the block *i* would finally form a twin to that of *c*. If twinning occurred in this manner it is obvious that one end of the twin lamellae formed by straining would be brought out in much greater relief than the other, and stand much above the originally smooth surface. As this is never found to occur in a mass of tin or zinc crystals, the twinning rotation must take

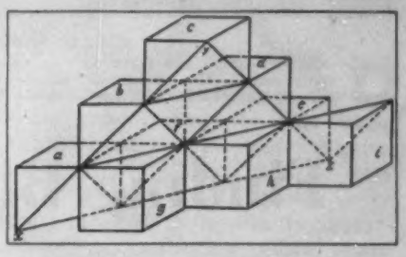


FIG. 13 — INTERNAL MOVEMENT OF TWIN LAMELLAE DURING ROTATION

place in the individual units, or small groups of such units. Since a movement of this kind must cause a further grinding between the units or groups of units, such as *g*, *h*, *i* inside the twin lamellae, the amount of amorphous matter or distortion of the space-lattice produced during mechanical crystal twinning must be at a maximum.

Hickman, Williams & Co. have published the third edition of their hand book on pig irons. The book contains 160 pages and is neatly bound in limp black leather. A large number of irons suited to a wide range of uses are described and analyzed.

Several technical articles, such as "Metallurgy of the Cupola", "Effects of Variation of Constituents of Cast Iron" and "The Constitution of Pig Iron" are included. Several pages also are devoted to approximate analyses of plain cast iron and alloys, numerous tables of interest to the foundry industry also being reproduced.

The enthusiast in the safety movement is he who knows he is working along broad, humanitarian lines. He is aware that safety does not consist of a few speeches, a splurge of ink and a moving picture show. These things help, but they alone will not suffice to pull men from the careless habits of years. That takes time, thought and constant effort. Above all, it must be considered that when indifference comes in at the door, safety flies out the window. This fact makes plain the need for constructive enthusiasm, which is simply enthusiasm plus brains.

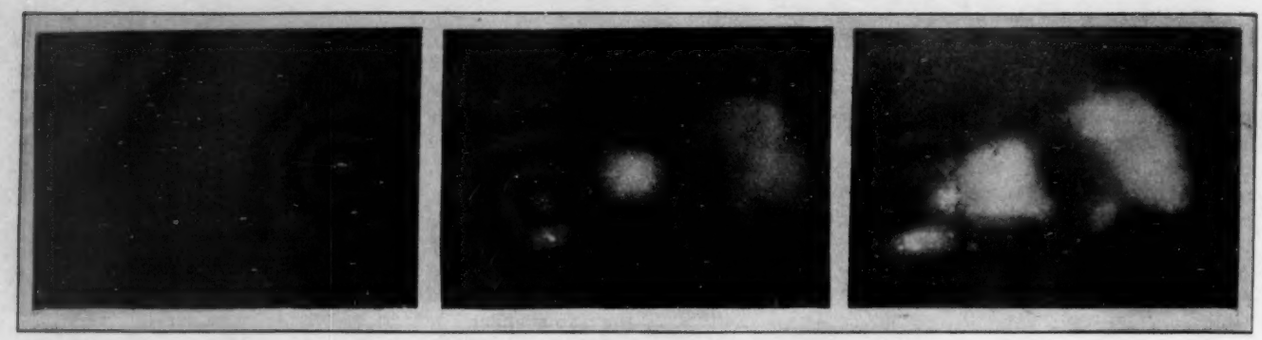


FIG. 1—RADIOGRAPHS OF COPPER CASTINGS, SHOWING BLOWHOLES

The first radiograph was taken with an exposure of two minutes and five seconds, and a current of 0.8 milliampere, at a distance of 50 centimeters. The second shows the sample, radiographed with an exposure of two minutes and 30 seconds duration and a similar current, at a distance of 30 centimeters. The third is the result of an exposure of five minutes with a 2-milliampere current, at a distance of 15 centimeters.

Finding Blowholes With the X-Rays

BY C. H. TONAMY

THOUGH various methods of testing metals have been used for some considerable time, such as chemical analysis, metallography, and mechanical and physical testing, no method, as far as the author is aware, has been evolved until recently, for detecting internal blowholes by external examinations. Such defeats usually being discovered only when the material is subjected to machining, the application of X-rays for this purpose seems likely to be of great service. Particularly is this the case with copper castings, since pure copper, when at a high temperature, absorbs gases from the air, thereby rendering likely the formation of blowholes. When making these castings a small quantity of phosphorus, tin, or zinc is usually added as a deoxidizer. Blowholes, however, are always to be guarded against, and in order to study their occurrence the author made some X-ray experiments upon a thin casting of pure copper, using a Gundelach X-ray tube. The specimen which was used in the experiment was a plate of pure copper, cast at a high temperature. The plate measured 5 x 4½ inches by ¼-inch, with a hole ⅛-inch diameter and 4½ inches deep drilled in one side, as shown in Fig. 2. A channel ⅛-inch deep was planed on the surface, in order to vary the thickness of the plate. The apparatus used in obtaining the radiograph of the blowholes, drilled hole, and channel is shown in Fig. 4. The specimen was laid on the X-ray plate vertically under the Gundelach tube. By varying the vertical distance, *B*, between the center of the tube and the X-ray plate, and also by varying the time of exposure and the strength of current, the results given in the accompanying table were obtained.

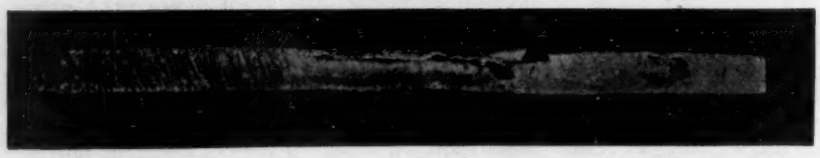


FIG. 3—SIDE VIEW OF SAMPLE CUT BY METAL SAW ALONG LINE INDICATED IN FIG. 2. SHOWING THE LARGE FLAW

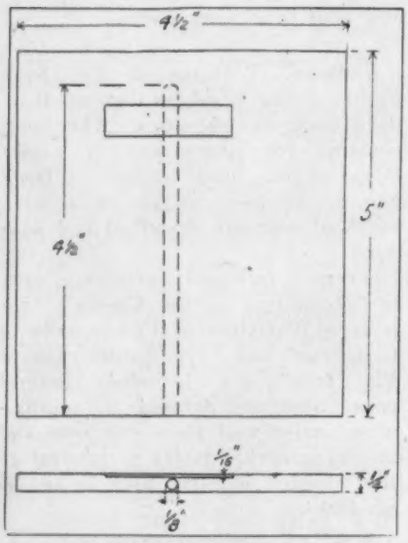


FIG. 2 — SAMPLE OF PURE COPPER CASTING FOR X-RAY EXAMINATION

In order to verify the results obtained, the plate was sawed across through the indicated positions of the blowholes, and these were found to be continuous, as shown in Fig. 3. In this experiment an X-ray source of ordinary strength was used, but had there been employed a much more powerful source, the radiographs would certainly have been sufficiently distinct to determine the exact position of the blowholes in the metal.

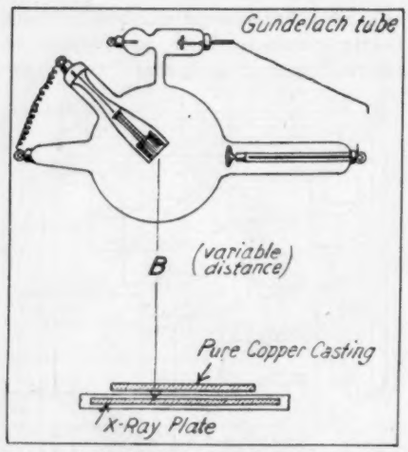


FIG. 4—ARRANGEMENT OF X-RAY TUBE, SAMPLE AND PHOTOGRAPHIC PLATE FOR EXAMINATION

No. of Experiment	Vertical Distance Centimeters	Time of Exposure Min.	Time of Exposure Sec.	Strength of Current Milliamperes	Remarks
1	50	2	5	0.8	Very faint spots obtained, which indicated the positions of blowholes.
2	30	2	30	0.8	More distinct spots obtained.
3	15	5	0	2.0	Much more distinct spots obtained together with the radiograph of the hole in the sample.

A paper read at the September meeting of the British Institute of Metals. The author is engineer, Mitsubishi Dockyard & Engineering Works, Kobe, Japan.

Iron and Money: Fact and Comment

Annual Report of Republic Iron & Steel Co. Shows Largest Earnings Since Organization —Derives Benefits From Large Extensions—Unfilled Orders Gain Heavily

FOR the first time, the Republic Iron & Steel Co. has begun to receive full benefit in the way of earning from its vast cash outlay for new plants, as well as from lower costs, greater efficiency and increased diversification of production. Its sixteenth annual report, for the year ended Dec. 31, 1915, surpassing all others in its history, reflects the income from increased capacity and more satisfactory prices for steel products prevalent in the last half of the year.

The statement shows total profits of $5,622,908, comparing with $2,407,522 in 1914, and with $5,027,742 in the year ending June 30, 1907, the best previous year; net profits, after deduction of interest charges, $3,515,820, compared with $1,028,748 in 1914 and $3,729,245 in 1907. The tables on this page indicate the trend of the net profits of the company for the past 16 years, these net profits resulting after all charges have been made, and thus applicable to dividends.

The largest gain by far was made in the second half of the year. Net earnings for the second half were $2,507,316, while those for the first half were $1,007,504.

The company's income accounts for the past two years compare as follows:

	1915.	1914.
†Net earnings	$5,439,598	$2,330,672
Int. and divs.	183,311	76,879
Total profit	$5,622,909	$2,407,552
Dep., rent, etc.	600,388	334,414
Extra dep.	400,000	.....
Sink. fund	.....	.....
Ext. fund	236,798	204,065
Total deduct	$1,237,186	$538,479
Net profits	4,385,723	1,869,074
Interest	869,904	840,326
Surplus	*$3,515,819	$1,028,748
Prfd. divs.	1,187,500	875,000
Surplus	$2,328,319	$153,748
Prev. surp.	6,615,290	6,512,778
Total surp.	$8,943,609	$6,666,526
Spec. approp.	588,655	51,236
P. & L. surp.	$8,354,954	$6,615,290

†After deducting charges for maintenance and repairs amounting to $1,647,309 in 1915, $1,432,365 in 1914, $1,654,573 in 1913, and $1,757,180 in 1912.

*Equal to 14.06 per cent on $25,000,000 preferred stock, as against 4.11 per cent on same stock previous year. There is still owing 11 per cent in accumulated dividends on preferred stock.

A more than ordinarily significant item contained in the report is that showing $27,173,852 expended for new construction since the organization of the company. This construction has been largely paid for out of earnings.

The company has at present a conservatively bonded debt of about $14,400,000. Its total capitalization is $65,500,000, so that bonded debt forms only about 22 per cent of the total capital. This compares, for instance, with Bethlehem Steel, whose bonded debt of $34,000,000 is 52 per cent of its capitalization. The following table shows the surplus for dividends, dividends paid and the percentage of balance for preferred stock of the Republic Iron & Steel Co. since organization:

Fiscal year.	Surp. for dividends.	Dividends paid.	Surp. after dividends.	Per cent on pfd.
1915*	$3,515,280	$1,187,500	$2,328,319	14.06
1914*	1,028,748	875,000	‡53,748	4.1
1913*	3,101,300	1,750,000	1,351,300	12.4
1912	1,273,262	876,000	398,262	5.2
1911	2,422,519	1,750,000	672,519	9.7
1910	2,902,915	†1,669,795	1,233,120	11.6
1909	1,629,346	413,478	1,215,868	7.9
1908	1,917,420	1,071,887	899,533	9.8
1907	3,729,245	‡3,026,535	702,710	18.3
1906	2,738,561	‡2,562,481	221,970	13.4
1905	1,373,607	.....	1,373,607	9.7
1904	‡254,188	357,260	‡611,488	‡1.2
1903	2,740,900	1,427,083	1,313,817	13.4
1902	2,248,831	1,424,108	828,723	11.1
1901	309,099	1,421,483	‡1,112,384	1.5
1900	3,643,728	1,421,679	2,222,384	17.8

*Year ended Dec. 31. Other years ended June 30. Company in 1912 changed fiscal year to end Dec. 31 instead of June 30.

†Does not include 6¾ per cent or $1,378,140 arrears of dividends on preferred stock satisfied by warrants.

‡Includes $1,333,308 deferred dividends paid on preferred stock.

§Includes $1,633,208 deferred dividends paid on preferred stock.

¶Loss or deduction.

Redeems Gold Notes

The Pittsburgh Steel Co. has called for redemption $500,000 of 6 per cent coupon gold notes, series A, dated Jan. 1, 1915, and due Jan. 1, 1918. Announcement is made that under the provisions of the trust agreement between the Pittsburgh Steel Co. and the Union Trust Co. as trustee, securing an issue of $5,000,000 notes, all of the unredeemed notes maturing Jan. 1, 1918, will be paid off on March 1 of this year. Holders of the notes in question, of which 120 are $1,000 notes and 76 are $5,000 notes, should present them to Union Trust Co., whereupon they will receive in cash the face amount of the notes plus one per cent premium and accrued interest to March 1, 1916.

Steel Stocks Gain

Iron and steel stocks generally registered gains during the past week. Crucible Steel was the leader, closing the week with a net gain of 12½ points. Trading in Crucible was heavy during the week, following the appearance of rumors that the control of the company was about to pass into new hands. Steel common closed at a net advance of ⅛, while Bethlehem gained 5 and Baldwin 4¼. Republic Iron & Steel displayed firmness on the strength of its excellent annual report. Quotations at the close of business Feb. 5 and changes for the week in the leading iron and steel stocks follow:

	Close Feb. 5.	Net chg.
American Can	61⅝	— ⅛
American Can, prfd.	110	—2⅜
Amer. Car & Fdy.	67⅛	+1⅜
Amer. Car & Fdy., prfd.	117½	.....
American Locomotive	66	+2⅛
American Locomotive, prfd.	102	— ⅜
American Steel Foundries	54⅝	— ⅛
Baldwin Locomotive	112¼	+4¼
Baldwin Locomotive, prfd.	108	— ½
Bethlehem Steel	470	+5
Bethlehem Steel, prfd.	130	.....
Colorado Fuel & Iron	44½	+ ½
Continental Can	78¼	—1¾
Continental Can, prfd.	107	—1
Crucible Steel	83	+12½
Crucible Steel, prfd.	116¼	+5⅛
General Electric	171	+ ½
Internat'l Harv. of N. J.	110⅜	+ ⅜
Inter. Harv. of N. J., prfd.	119	+3
Internat'l Harv. Corp.	73	—1
Lackawanna Steel	81⅛	—1⅛
Nat'l Enamel'g & Stamp. Co.	25¼	+ ¼
Nat'l En. & Stmp. Co., prfd.	96	+3
Pressed Steel Car	55½	+ ½
Pressed Steel Car, prfd.	101⅛	—2⅛
Pullman Palace Car	165	— ⅝
Republic Iron & Steel	53	+2¼
Republic Iron & Steel, prfd.	110	+2
U. S. Cast Iron Pipe & Fdy.	18⅜	+1⅜
U. S. C. I. P. & Fdy., prfd.	48½	—1½
United States Steel	82¾	+ ½
U. S. Steel, prfd.	116	+ ⅛
Westinghouse Mfg.	66	— ½

The following table shows changes in maximum quotations of stocks not listed on the New York exchange:

	High Feb. 4.	High Jan. 28.
American Radiator	400	397½
American Ship Building	39	35
Cambria Steel	75⅝	75
Chicago Pneumatic Tool	74¾	75½
LaBelle Iron Works	51½	52½
Lake Superior Corpn.	9⅛	10
Pennsylvania Steel	.....	61
Stewart-Warner Speed. Co.	88¼	90½
Warwick Iron & Steel Co.	10⅜	10⅜
Westinghouse Air Brake	136	137
Westinghouse Elec. & Mfg. Co.	67½	67¼

The Myerstown Foundry & Mfg. Co., Myerstown, Pa., has declared a dividend of 5 per cent from 1915 earnings on both preferred and common stocks, while a considerable sum was added to the surplus account.

Business News of Nation's Capital

Federal Trade Commission Shows Velvet Glove Tendencies in Case of Dubious Trade Practices—Stock Holder Wants Pump Company Investigated

INTERESTING points as to the legality of many practices of trade are contained in 40 conference rulings made public yesterday by the federal trade commission. In each instance the practices mentioned, if found unlawful, have been, or will be, voluntarily discontinued. The commission therefore held that no proceedings would be begun against those involved in the charges. The rulings are taken to indicate that the commission desires to be a constructive body and proposes to remedy unfair practices of trade, whenever possible, by urging those engaged in such practices to desist, rather than by means of formal legal proceedings. The latter course is to be adopted, it is said, only when it is absolutely necessary. The rulings indicate that those who are charged with illegal practices have co-operated in a cordial spirit with the commission. Future rulings will be announced from time to time through the press and will be subsequently compiled and issued by the commission in successive bulletins. The rulings are not decisions in formal proceedings, being merely expressions of opinions held by the commission. They concern applications for the issuance of complaints and informal inquiries which involve the interpretation of the federal trade comisison act and the Clayton act. The enforcement of these enactments is a part of the duties of the commission. While yesterday's rulings may be regarded as precedents, insofar as they are applicable in proceedings before the commission, a more extensive presentation of facts in later cases may result in their modification, and they should not, therefore, be regarded as conclusive.

Passing upon an application for the issuance of a complaint respecting the enforcement of certain local labor union rules, the commission held that as the labor union is not engaged in commerce, the commission has no jurisdiction to determine whether or not the practice complained of is unlawful.

On application for the issuance of a complaint, it appeared that certain foundrymen made and sold repair parts for stoves manufactured by the applicant. It was not claimed that the stoves were patented or that the foundrymen led the public to believe that the parts were made by the applicant. The commission held that under such circumstances, the making and selling of repair parts for unpatented articles, by others than the original manufacturer, is not a violation of section 5 of the federal trade commission act.

Do Not Bar Agencies

Another ruling held that neither the federal trade commisison act nor the Clayton act prohibits manufacturers from selling their product exclusively through one dealer in a given territory. It was also held that all manufacturers engaged in interstate commerce, irrespective of size, are subject to the provisions of the Clayton act. Passing the right of one manufacturer to buy out a competitor in the same line of business, the commission held that the only jurisdiction of the commission in respect to such transactions is to enforce the provisions of section 7 of the Clayton act, prohibiting the acquisition, by any corporation engaged in interstate commerce, of the capital stock, in whole or in part, of another corporation thus engaged, where the tendency of such acquisition may be to substantially lessen competition between such two corporations, or to restrain interstate commerce or to create a monopoly. It is also possible to enforce section 5 of the federal trade commission act, if such purchase, either of the property or the capital stock, in connection with other circumstances, might constitute an unfair method of competition. It was held, likewise, that the mere purchase of the property of such a competitor, other than capital stock, is not prohibited by the Clayton act or by the federal trade commission act.

Urges Investigation

Washington, Feb. 8.—An investigation of the proposed reorganization of the International Steam Pump Co., a New Jersey corporation, now in the hands of a receiver, was urged at a public hearing before the federal trade commission, last Friday, being subsequently granted. A joint committee of stockholders and bond holders expects to buy the corporation's property at judicial sale in a short time and to put into effect a plan of reorganization which was agreed upon after many conferences. The hearing was held upon allegations sent to the commission by Mrs. Eva Cortland Hawkes, a holder of the preferred stock of the pump company. It is charged by her that the company has been conducted in violation of the Sherman anti-trust law, and that if the reorganization be permitted to go into effect the unlawful restraint and attempt at monopolization will be perpetrated. Homer S. Cummings appeared for her, while Paul D. Cravath and Gilbert H. Montague represented the joint reorganization committee. The contentions made by the two factions were spirited to a degree.

The new body has been asked to make the investigation under paragraphs *A* and *B* of the sixth section of the federal trade commission act. These paragraphs authorize the commission to make inquiries to ascertain if the anti-trust or any other regulatory acts are being violated, and to make recommendations to congress with respect to legislation the commission may deem necessary or desirable. Conceding that the commission has the power to make the proposed investigation, Mr. Cravath and Mr. Montague advised against the inquiry; first, because the pump company is not acting in violation of the Sherman law, and, second, because, as they view it, the request for the investigation is merely an attempt on the part of the unsuccessful litigant to accomplish, in an indirect way, what it has been impossible to bring about by appeals to courts. They asserted that the object is to prevent reorganization, so that stock and bond holders assenting to the plan may make terms with the complainant.

Mr. Montague spoke of the request for an investigation as an "eleventh hour repentance" and an "amusing contrition." Mr. Cummings said it is another instance of "high finance of a certain bond holding interest, undertaking to squeeze out other interests and take possession of the property." Figures were presented to the commission by Mr. Cravath to show that the pump company has been such a small factor in its field that it is ludicrous even to suggest that it is a

monopoly or even a dominating element. He said that, while it is called a pump company, only 40 per cent of its business has been in pumps. It has controlled, he declared, only 23 per cent of the steam pump business, 12 per cent of centrifugals, 12 per cent of condensers, and 4 per cent of heaters. In one line, it was stated, its production amounted to only nine-tenths of 1 per cent of the whole production. Bond holders, said Mr. Cravath, found themselves with about $10,000,000 of investment unsatisfactorily secured. There was, he added, a default in the payment of interest. The gross and net earnings were said to have been declining since 1910, and as a result a receiver was asked for and appointed. He declared that the bond holders frankly avow their purpose and desire to perpetuate this industrial establishment.

"Of course," he said, "this proceeding, on its face, is insincere, because if the charge that the corporation has been a violation of the Sherman law should be sustained, such a finding would force the relinquishing of the Worthington plant, its most valuable asset. That would mean loss, not merely for the complainant, but for all of us. She avers that the purpose is to wipe out the preferred stockholders, of whom she is one. We say that reorganization would not destroy the preferred stock. The plan has been accepted by practically all stock holders. If the plan goes through, it is hoped the property and business of the old International Steam Pump Co. will be held by direct ownership." Mr. Cravath added, however, that it was not believed the control of the different plants by means of stockholding has been or would be in violation of the anti-trust law. He did not think the commission could or should take up an inquiry on a mere allegation that there has been or may be unfair methods of competition, without a more specific showing of acts to arrest its attention, than had been made. Mr. Montague declared the whole thing was purely a private fight, asserting that an investigation could serve no public interest.

Mr. Cummings declared that he had come to the commission more for the purpose of getting than imparting instructions, and that he knew nothing about the procedure. Therefore, he said, he asked for a public hearing. He challenged the accuracy of figures presented by Mr. Cravath.

The Iowa Engineering Society will hold its annual meeting at Des Moines, Feb. 16-18. J. H. Dunlap, Iowa City, is secretary.

Ready to Fight Fire

Remington Arms Co. Takes Steps to Protect Big Plant

The Remington Arms-Union Metallic Cartridge Co., Bridgeport, Conn., is organizing a fire department designed to be as efficient as any conducted by an industrial concern in the United States. When fully organized it will probably equal in equipment and personnel any municipal department. Work of establishing the new corps has already progressed under the personal supervision of former Battalion Chief John H. Travis, of the Brooklyn, N. Y., fire department, who will become chief of the department at the U. M. C. works. Trained fire fighters from various departments in the United States are being employed. One captain, J. R. Vaughan, who held a similar position in the New York fire department, has been employed, and another captain and two lieutenants from other cities will soon be added to the staff. In all, there will be 20 firemen on two shifts, 10 working during the day and 10 at night. They will sleep in a special fire building, which will soon be erected in a central location at the big Barnum avenue plant. On the lower floor will be the chemical engine, hose wagon, steamer and truck, all of the most modern design. A new Knox chemical engine, larger than any now owned by the city of Bridgeport, has been delivered and is now ready for emergency fires. An extension truck capable of reaching six stories is said to have been ordered.

Engineers Will Meet

The annual banquet of the Engineers' Society of Western Pennsylvania will be held Feb. 14 in Memorial Hall, Pittsburgh. Elmer K. Hiles, secretary of the society, has announced the following program: Samuel Insull, president Commonwealth Edison Co., Chicago, will discuss "Universal Electricity Supply"; Alba B. Johnson, president Baldwin Locomotive Works, Philadelphia, will talk on "Business Conditions After the War", and Wilbur D. Nesbit, author, Chicago, will discuss "Conversational Engineering". Walther Riddle, vice president Sterling Varnish Co., Pittsburgh, will be toastmaster.

Announce Convention Dates

W. O. Oschmann, secretary of the Association of Iron and Steel Electrical Engineers, announces that the 1916 convention will be held Sept. 18 to 22, inclusive, at Chicago.

The American Supply and Machinery Manufacturers' Association, the National Supply and Machinery Dealers' Association and the Southern Supply and Machinery Dealers' Association will hold a joint convention May 10-12, at the William Penn hotel, Pittsburgh. Charles G. Graham, vice president of the Graham Nut Co., Pittsburgh, is chairman of the local committee in charge of the program.

The American Iron, Steel and Heavy Hardware Association will hold its annual convention May 22, at the William Penn hotel, Pittsburgh.

Busy Detroit

Turns Out Large Percentage of Motor Cars of the Country

Approximately 67 per cent of the 703,527 motor cars produced in the United States during 1915 were made in Detroit, according to figures just prepared by the city's board of commerce. The standing is shown:

	1913.	1914.	1915.
United States.....	450,000	515,101	703,527
Detroit	238,000	350,000	475,000

The pre-eminence is, of course, largely founded on the city's possession of the main plant of the Ford company. This factory is now turning out very close to half the cars produced. The following figures show the volume of cars, according to estimates from different companies in Detroit:

Ford	308,213	600,000
Buick	45,000	60,000
Studebeker	40,000	60,000
Cadillac	13,001	20,000
Paige-Detroit	8,000	20,000
Oakland	5,000	20,000
Maxwell	65,000	Not given
Hudson	13,000	Not given

Despite the growth of the output and the increase in the number of men employed, there are fewer companies manufacturing motor cars in Detroit now than there were in 1912. At that time there were 33 concerns; now there are 28. The large concerns have grown at a phenomenal speed. In 1900, before the automobile began to develop, the population of the city was 200,000; in 1910, when the industry had been well established, the federal census gave Detroit a population of 465,000; today it is close to 725,000. The automobile business in itself would support a city of 300,000.

The figures show that although the demand for vehicles by the warring nations of Europe is large, there has been a marked increase in the domestic demand and this trade is expected to show increases during the coming year.

Ore Dock Shipments Big

January Broke All Records—Furnaces Not Covered May Be Caught Short

Shipments of Lake Superior iron ore from Lake Erie docks in January were 887,426 tons, the largest ever reported. This figure compares with 249,123 tons shipped from these docks in January, 1915. In 1913, the next largest dock shipment in January up to this year, 842,952 tons went to interior furnaces, so that the January movement this year, while heavy because of the favorable weather and the insistent demand, is regarded as reasonably good.

A glance into the possibilities shows that the amount of ore likely to remain upon Lake Erie docks May 1 next, when lake navigation formally opens, will be less than popularly supposed. The ore reported on dock on Feb. 1, as published last Friday, was 7,071,275 tons, compared with 7,802,806 tons on Feb. 1, 1915. The winter and spring ore movement in 1913 closely parallel conditions as seen today. In February, 1913, the railroads carried 586,000 tons of lower lake port ore to inland stacks; in March of that year they carried 1,048,000 tons, and in April 1,276,000 tons, or a total for the three months of 2,910,000 tons. Supposing this year 590,000 tons were to be moved in February, 1,100,000 in March and 1,500,000 in April, as now is being planned, it would mean a total of 3,190,000 tons moved from Lake Erie docks between Feb. 1 and May 1. It would reduce the amount on dock on May 1 to about 3,880,000 tons.

Supposing the amount of ore on Lake Erie docks were to be reduced to about 3,880,000 tons by May 1, this would be considerably below the tonnage held on dock on that date for the past eight years. But it would not be nearly so small as in some of the busy years previous to 1908 as the following figures will show:

On May 1.	Gross tons.
1915	6,092,303
1914	5,920,157
1913	5,909,829
1912	6,029,941
1911	6,949,593
1910	5,480,021
1909	5,829,162
1908	5,914,294
1907	2,187,962
1906	1,791,090
1905	2,271,631
1904	4,534,103
1903	3,592,367
1902	2,848,194
1901	3,050,183
1900	1,720,656

But it is not believed the railroads will find the weather from henceforward so favorable as in January for loading and unloading ore cars at lower lake ports and interior furnaces. Frozen ore in cars is difficult to handle. But the movement through March and especially April is expected by both dock managers and railroad men to take on a greatly accelerated gait. Such a speeding up of the movement would mean much smaller supplies of ore left on lower lake docks by May 1.

Facts to Bear in Mind.

In considering these figures, three important facts should be kept in mind. One is that in the periods above given when the smaller ore tonnages were left on lower lake docks on May 1, say from 1900 up to 1906, the total ore receipts at Lake Erie docks in the preceding year had been exceedingly small compared with recent years; in 1905 being 9,000,000 tons less than the total ore movement of 37,967,460 tons to these docks in 1915, leaving 1,791,090 tons on dock May 1, 1906; and the total lower lake port receipts in the busy year of 1906 were 5,600,000 tons less than in 1915, leaving 2,187,962 tons on dock May 1, 1907. The second fact is that less unsold ore will remain on these docks next May than ever before, the old custom of bringing down a lot of ore to be sold later having been abandoned in late years. The third fact is that much of the odd lots of misfit ore, which for years had been carried along on the books as "ore on dock" but which many thought never would be used up because of its off and mixed grade, has been sold off to be used as mixtures. The ore on dock today is far cleaner and more of it actually available for furnace use than in many years.

This brings the availability of next year's ore supply right down to the size of demand for ore from furnaces, this in turn hanging upon the liveliness of the pig iron market; and furthermore, it also brings prominently into calculation whether furnaces with small stocks on hand have close ore supply connections.

Dock Tonnage Light

Stocks of Lake Superior iron ore on Lake Erie docks on Feb. 1, 1916, are 7,071,275 tons, compared with 7,802,806 tons on Feb. 1, a year ago, a decrease of 731,531 tons in February of this year, and 1,097,745 tons less than Feb. 1, 1914. The docks hold this smaller tonnage of ore this year than last year at this time despite the fact that 10,821,759 tons more ore was brought down to these Lake Erie docks in the season of 1916 with 29,076,067 tons, than was brought down in 1914 with its total shipments to lower lake docks of 18,254,308.

The amount on dock Feb. 1 this year, 7,071,275, is remarkably small and shows that by May 1, when lake navigation formally opens, the amount expected to be found then on dock will be exceedingly small, probably the smallest in years. These figures also show that a great deal of ore last autumn went directly from ship to furnace; and they also show that the railroads have been exceedingly busy this winter hauling ore from dock to inland furnaces. The distribution of the ore on dock Feb. 1, 1916, among lower lake ports is as follows:

Port.	Gross tons. 1916.	1915.
Buffalo and Tonawanda	265,783	227,813
Erie	532,384	478,606
Conneaut	693,633	995,305
Ashtabula	2,361,415	2,547,936
Fairport	299,442	343,327
Cleveland	1,555,334	1,927,241
Lorain	596,984	514,361
Huron	493,254	470,242
Sandusky	.....	2,471
Toledo	273,016	295,504
Total	7,071,275	7,802,806

Seek Reparation

Steel Corporation Subsidiaries File 23 Petitions, Asking Return of Funds.

Washington, Feb. 8. — Subsidiary manufacturing companies of the United States Steel Corporation recently filed 23 petitions with the interstate commerce commission seeking reparation aggregating $489,500 from common carriers on shipments made between April 1, 1914, and April 14, 1915. The petitions are an outgrowth of the decisions by the commission in the "industrial railroads" cases. In the original decision the commission held that the steel plant lines were plant facilities and ordered that the trunk lines cancel joint rates and through routes which were established with the former. The supplemental decision reversed the original finding and the joint rates and through routes, canceled on April 1, 1914, were re-established on April 14, 1915.

During the interim the Steel Corporation plants which have just filed the petitions, including the Carnegie Steel Co., the American Steel & Wire Co. and the National Tube Co., point out that the allowances which had been granted previously were absorbed by the railroads, causing the manufacturing plants to pay additional charges on shipments. Included

Wages Are Adjusted

Ore Miners at Richard Mine Have Been Given Good Scale

EASTON, Feb. 7.—The wage adjustment at the Richard iron ore mine of the Thomas Iron Co. has been satisfactorily settled. An increase of about 10 per cent in wages went into effect Feb. 1. All shift men on the surface will work three 8-hour shifts; all other surface men will work nine hours a day. A sliding scale wage is being worked out. Drill runners get $2.65 for eight hours, muckers and scrammers get $2.35 for eight hours underground. Day laborers on the surface get $2 for nine hours.

Strikes Rife at Trenton

Trenton, N. J., Feb. 8.—Strikes continue among many of the industrial plants in this section. The entire plant of the John A. Roebling's Sons Co. was badly handicapped for several days as a result of a strike of stokers and boiler tenders for an increase in pay. The men were being paid 20 cents an hour and the strike was finally settled by an increase to 25 cents an hour. The strike indirectly affected nearly 6,000 men. A few days later the Roebling company voluntarily granted a 10 per cent increase to more than 1,000 employes in the insulated wire department.

A portion of the plant of the J. L. Mott Iron Works Co. was also tied up by a strike of 90 molders and laborers for more pay. Later more employes quit work for an increase. The Mott company granted the demands of the molders from $3.50 to $4 a day. The employes of the National Radiator Co. went on a strike because the company insisted upon paying off semi-monthly instead of weekly. The matter has not been adjusted.

The United States Cast Iron Pipe & Foundry Co. has announced that an increase of 15 per cent has been granted to the 500 employes of its Burlington, N. J., plant. The increase went into effect Feb. 1. The employes of the Webb Wire works also struck for an increase of 10 per cent and this was granted.

Two Bonuses Paid

The Scovill Mfg. Co., Waterbury, Conn., on Feb. 2, gave its 8,000 employes another bonus of 5 per cent of their wages since Oct. 1, 1915. A statement accompanied each pay envelope, in which the president, Chauncey P. Goss, informed the employes that it was the wish of the company that all of the employes share in the great prosperity of the corporation. This is the second bonus paid in a short time. An extra 5 per cent dividend, the fourth since last November, was also declared, payable to stockholders on Feb. 8.

Grant Minimum

By Eight New England Foundrymen—Sporadic Strike Trouble

Seven out of the eight foundry owners in Worcester, Mass., that were requested to grant a minimum wage of $3.50 for a 9-hour day, effective Feb. 7, have already signified their intention of complying. It also is stated that some are now paying this wage.

Beginning with a few hands in the tinning room of George W. Prentiss & Co., wire makers, Holyoke, Mass., a strike has spread until about 75 men have left work. They have made no demands on the firm. The strikers are planning to organize a union, when a demand will be made for higher wages. The firm is busy on large orders for wire from Canada, from where it is sent to Europe for use in the war zone.

An increase of 7½ per cent in wages has been made by the Fales & Jenks Machine Co., Pawtucket, R. I., to its 700 employes. The 200 employes of the R. D. Mason Co., Pawtucket, R. I., have accepted a 10 per cent wage increase and returned to work after being out on a strike for a week. They demanded a flat increase of $1 per week.

War Bonus Paid

The January war bonus of the Reed-Prentice Co., Worcester, Mass., amounted to $10,200, being distributed among approximately 800 employes. It was the fifth the company has disbursed, totalling $42,200 paid out since September. While the amount for last month is but $200 more than for December, it is accounted for by the fact that there were five pay days in December and but four in January. The number of employes that shared in the distribution is larger than for December, when about 775 participated.

In a recent issue of *The Iron Trade Review* it was stated that the Ashland Steel Co. is considering some extensive installations. This was incorrect, the installations being considered by the Ashland Iron & Mining Co., and not the Ashland Steel Co., Ashland, Ky.

The blast furnace of the Emporium Iron Co., Emporium, Pa., which has been idle for the past 18 months, has resumed operations.

Indictment Asked

Against J. V. Thompson, Alleging Falsification of Reports

The financial troubles of Josiah V. Thompson, Uniontown banker and coal land owner, became more seriously complicated recently when the federal grand jury here made a presentment to Judge Charles P. Orr, recommending the indictment of Mr. Thompson on a number of charges growing out of his conduct of the bank's business. The court ordered indictments drawn. The grand jury adjourned until 1:30 o'clock Monday afternoon. The presentment follows:

Copy of Presentment.

"The grand jury of the United States of America, inquiring in and for the western district of Pennsylvania, upon their oath and solemn affirmation, respectfully do present:

"That on the fifteenth day of October, 1914, and at divers times and dates prior thereto and thereafter, at Uniontown, in the county of Fayette, in the said western district of Pennsylvania, and within the jurisdiction of this court, Josiah V. Thompson, unlawfully, knowingly, feloniously and wilfully did misapply certain of the money, funds and credits of the First National bank, of Uniontown, Pa., and did make and cause to be made certain false entries both in the books of said bank and in certain reports made to the comptroller of the currency, and, in addition thereto, did swear falsely in connection with certain of said reports made to the comptroller of the currency.

"The aforesaid violations of law, having come to the knowledge of the grand jury aforesaid, through the evidence of certain witnesses sworn before us, the grand jury has made presentment as aforesaid of the same to the court, and further requests the court that the United States District Attorney be instructed to lay before said grand jury a bill or bills of indictment more particularly and at length setting forth said violation of law.

D. D. TORRY, Foreman.

A memorial tablet of the late George Westinghouse, founder of numerous industries bearing his name, was unveiled Jan. 29, at the third annual banquet of the Westinghouse Veteran Employes' Association, consisting of employes from the Westinghouse Electric & Mfg. Co. who have been with the concern 20 years or more. The tablet was presented by Charles F. Scott, of Yale University, and was accepted on behalf of the company by Guy E. Tripp, chairman of the board of directors.

Tool Prices Take an Upward Spurt

Ten Per Cent Increase Fails to Check Buying—Railroads Come In Briskly—
Big Inquiry Received From Australia

OF CHIEF interest in the machine tool market is a further advance in prices. A number of important manufacturers have advanced their prices 10 per cent on nearly all machine tools, so that while many of the makers have not as yet given their selling agents formal notification of such advances, prices now may be said to be approximately 25 to 60 per cent higher than they were a year ago. As has been previously reported, a number of manufacturers of milling machines and other tools, for some time past have not been quoting any prices due to the fact that the deliveries they had to offer ranged all the way from nine to 15 months ahead. These interests have been taking business for future shipment without naming a price, the customer agreeing to pay the figures which are being quoted at the time of delivery; this policy continues in effect with these concerns.

The market is rather quiet, compared with previous weeks. The largest buying has been that of the French commission, 44 Whitehall street, New York, which has placed orders for additional large-swing lathes as well as other equipment for shipment within the next two or three months. There also has been some buying for export both to Russia and England, but this was not of large proportions. The domestic demand keeps up steadily, but does not involve any large orders. A fairly large volume continues to come out from the railroads, but in small lots; the Baltimore & Ohio, Santa Fe, Pennsylvania and Lehigh Valley railroads all have placed orders for one or two tools each. The Santa Fe also has issued an important new list. The Southern Pacific also has issued a fair-sized list.

Builders of mining and other special machinery report materially increased sales, involving shipments to Japan, Australia and South America. Considerable business in mining machinery has been placed by the Bethlehem-Chile Iron Mines Co. and by the Chile Exploration Co. The Bethlehem-Chile Iron Mines Co. also has placed an order for a 40-ton gantry crane with the Alliance Machine Co. The large order for steel works cranes on which the Russian commission in the Flatiron building, New York, has been taking bids for several weeks, has not yet been awarded. The Midvale Steel & Ordnance Co. is taking bids on twenty 5-ton electric traveling cranes, and it is expected these will be placed shortly. The Southern Pacific railroad is taking bids on a 50-ton, double trolley, 6-motor crane, with span of 64 feet. The Delaware River Discharging Co., Philadelphia, has let a contract for two digger cranes, for installation on coal barges, to the McMyler Interstate Co., Bedford, O.

Big Australian Equipment Inquiry Issued

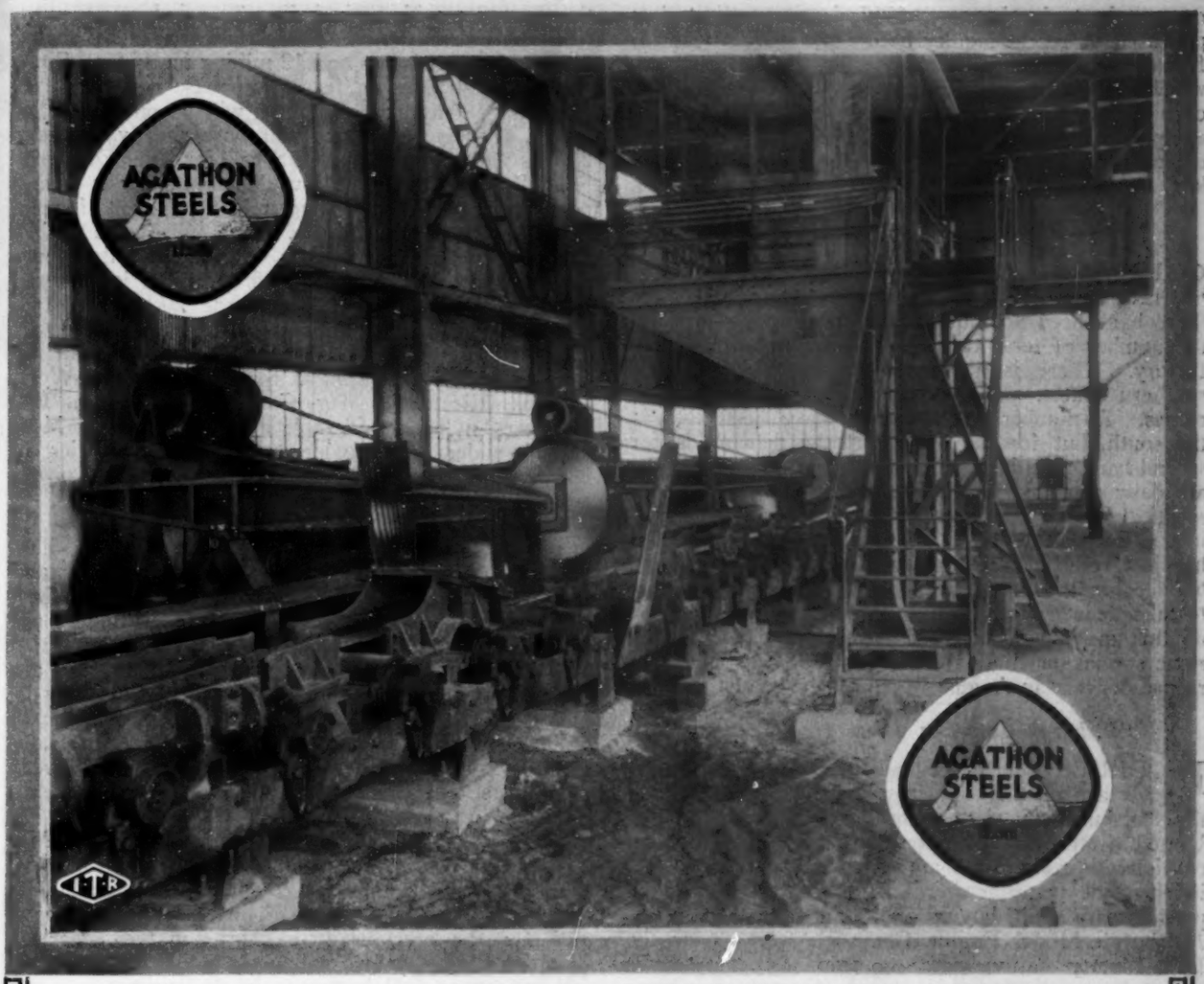
BIDS will be received by the director of navy contracts, Melbourne, Australia for 43 machines of various types for equipping the Commonwealth Naval Yard at Cockatoo island, Sydney, N. S. W. The last mail sailing from San Francisco carrying bids leaves Feb. 22. The machines required are as follows: Three 50-ton overhead traveling cranes; one 25-ton overhead traveling crane; two 5-ton overhead traveling cranes; one 10-ton revolving cantilever crane; two 5-ton traveling jib cranes; two 7½-ton jib cranes; one 5-ton jib crane; two 15-ton hydraulic cranes; one 6-ton hydraulic crane; one 6-ton hydraulic wall crane; two electric passenger elevators; two electric freight elevators; one 2½-ton gage locomotive with crane attached; one 2½-ton gage locomotive without crane attachment; three electrically-driven air compressors with a capacity of 1,500 cubic feet; one 15-ton hydraulic winch; one 5-ton hydraulic winch; nine 10-ton hydraulic capstans; two 5-ton hydraulic capstans; one bar shearing machine; one double-ended horizontal punching machine and one 10-ton overhead traveling crane for installation in a ship fitting shop.

Eastern Concerns Increasing Capacity

AMONG concerns in the east which are enlarging their capacity are the John Bath Co., Worcester, Mass.; Gannon Meter Co., Newark, N. J.; Fore River Ship Building Corporation, Quincy, Mass.; Rome Metallic Bedstead Co., New York; Campbell Electric Co., Lynn, Mass.; Irvington Mfg. Co., Irvington, N. J.; Chase Metal Works, Waterbury, Conn.; Rockwood-Drake Co., Plainville, Conn.; Hess Steel Corporation, Philadelphia; Schaum & Uhlinger, Philadelphia; Schutte & Koerting Co., Philadelphia; Baltimore Copper Smelting & Rolling Co., Baltimore, and the Iron Clad Mfg. Co., Brooklyn, N. Y.

Chicago's Domestic Business Brightens

MACHINE tool dealers in Chicago are experiencing a decided increase in business from domestic users, a condition which has been growing for several weeks. As an illustration of the wide variety of concerns adding to their equipment, the experience of one dealer last week may be mentioned. Eight machines were sold from his warehouse floor in a single day, most of them for delivery in Chicago and the immediate vicinity. These tools went to a car builder, a meat packer, a sugar machinery manufacturer, a toolmaker, a gear-cutting plant, an engine builder, an ordnance company, a metal furniture manufacturer. Other machines disposed of about the same time went to a repair shop at the Union Stock Yards, Chicago. This experience is not an unusual one at this time and while the strongest demand is coming from automobile and munitions manufacturers, every line of industry seems to be gaining strength and seeking additional equipment. There seems to be less call for machinery for export and comparatively little is being sold. Possibly this is due to the fact that manufacturers are only now making deliveries on orders placed some months ago. Deliveries of new machinery from manufacturers were better during January than for several months before and February promises an improvement. A number of the machines now coming out from manufacturers are shipped direct from the builder to the user without entering the dealer's warehouse. Orders are being taken for July delivery in some cases, while others are unable to promise anything earlier than November. In a few instances



Bar Saws in Operation

Accurate Sawing Reduces Waste

AGATHON STEELS

"AGATHON" Chrome Nickel
"AGATHON" Chrome Steel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steel
"AGATHON" Special Analyses
"AGATHON" Vanadium
"AGATHON" Silico-Manganese
"AGATHON" High Carbon

These high speed electrically driven saws, operated only by the most careful and expert of workmen, insure your steel being cut *accurately* to length. You can be certain that your material will reach you *on time* and in just the *exact dimensions* specified. Thus delay and waste are avoided.

There is not a single detail in our entire organization that does not do its full share toward the production of *"Agathon"* Quality and Service.

Will you pay us a visit and see our plant with your own eyes? Come at your first opportunity.

THE CENTRAL STEEL COMPANY

MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Bldg., F. Walter Guibert, District Representative
Cleveland Office: Hickox Bldg. The Hamill-Hickox Co., District Representative

on certain tools, January, 1917, is the earliest date promised. A recent inquiry before the market was for full equipment for a machine shop in a nearby city which will go into service in about four months. Chicago dealers have been thoroughly canvassed and the equipment obtained, one dealer taking about 20 machines, while the remainder was distributed in smaller lots.

Cleveland Market Coming To

SALES during the past week in Cleveland have been on the increase and dealers report that while there have been no inquiries of startling proportions, the number of tools turned over has been very satisfactory. There is an increasing inquiry from the southern states, particularly for woodworking machines. A number of new tools have been sold in the south, but for the most part the demand is for second-hand machines. The diversity of inquiries that are daily entering the market has convinced the more sceptical dealers that local business is far from slacking, as was intimated a few weeks ago. One dealer has just received an order from a Detroit automobile builder for 100 machines, the purchaser being willing to take delivery any time during 1916. A large part of this order will be filled within 90 days, but on some special machines the builder has been obliged to refuse delivery in August in spite of a bonus.

Pittsburgh Interests Issue Heavy Lists

INQUIRIES for miscellaneous types of machine tools are coming out in rather heavy volume in the Pittsburgh district. Subsidiary companies of the United States Steel Corporation are negotiating for considerable rolling mill and auxiliary equipment, and independent manufacturers of iron, steel and allied products are again buying additional machinery. The Pittsburgh Model Engine Co., with works near the East Liberty station, has been the most conspicuous recent buyer, having just closed contracts for more than a 100 machines, including 28 grinders, 30 automatic screw machines, 10 multiple drills, 15 engine lathes, 25 turret lathes and 12 milling machines. Since the company plans to further increase capacity, it is likely that additional equipment will be purchased.

The Carnegie Steel Co. will close shortly for four 20-ton electric traveling cranes, for the Duquesne Steel Works, Duquesne, Pa. The company is asking preliminary bids on rolling mill equipment for its new plant at McDonald, O., which will house 10 bar and hoop mills. Twenty bar mill cranes will be purchased. The Wheeling Steel & Iron Co. is reported to have closed for two 5-ton, one 20-ton and two 15-ton cranes for its tin plate plant at Yorkville, O. The Driggs-Seabury Ordnance Co. has bought 20 large lathes for its plant at Sharon, Pa. The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been buying considerable milling machinery. Most crane builders are unable to promise deliveries in less than seven months, but several agents are promising machine tools for rather nearby shipment.

Cincinnati District Improving Rapidly

CINCINNATI manufacturers of drills, reamers and small machine tool parts are enjoying the best business in the history of their trade. Builders are making every effort to catch up with deliveries which fell behind during the last quarter of 1915, and are sub-letting contracts for parts whenever time may be gained. The strike has been broken in Cincinnati, and all shops are now running at capacity. In Hamilton, O., an agreement has been reached between machinists and employers, and all strikers have returned to work.

The Oesterlein Machine Co. and the Fosdick Machine Tool Co. are the latest Cincinnati machine tool plants to plan extensions to their plants and both will build additions shortly. Plans are nearing completion for the erection of a plant for the American Tool Works Co., which will cover a city block. Building operations will be begun in the spring.

Among New England Factories

BANGOR, ME. — The Bangor Cast Stone Products Co. has been incorporated; $50,000 capital stock; by George Cuozzo, Isiah K. Stetson and Ernest J. Cuozzo, New York.

ISLAND FALLS, ME. — The large steam sawmill of the Mattawamkeag Lumber Co. was damaged by fire, causing a loss of more than $50,000.

LEWISTON, ME.—The Maine Mill Supply Co. has been incorporated; $10,000 capital stock; by Morris Alpren, Abraham Rosenfield and Benjamin L. Berman.

MONTPELIER, VT.—The John Nelson Construction Co. has been incorporated; $5,000 capital stock; by John Nelson, Catherine F. Nelson and Catherine E. Nelson, Brooklyn, N. Y.

BOSTON.—The Salada Tea Co. will build a brick and steel, fireproof 8-story, 80 x 98-foot warehouse at Berkeley and Stuart streets.

BOSTON.—Fire in the Tremont theater, caused a loss of $125,000. The theater will be rebuilt.

BOSTON.—Boston is to have a temple of labor near the center of the city, for which $100,000 will be appropriated for a site and $300,000 for a building.

BOSTON. — The Boston Wharf Co. has awarded contract for a brick, 6-story, 55 x 100-foot warehouse on Farnsworth street, South Boston, which has been leased to the Richardson & Boynton Co., maker of stoves and furnaces.

BOSTON.—The city will build a $250,000 school administration building on Beacon hill.

CHICOPEE, MASS.—The Page-Storm Drop Forge Co. has taken out a permit to build a $7,200 brick office building.

EAST WALPOLE, MASS.—A contract has been awarded for eight factory buildings for F. W. Bird & Son, paper makers, to cost $125,000. The largest is to be of brick, two stories, 38 x 307 feet.

GREENFIELD, MASS. — The Keystone Stoker Co., a $250,000 corporation, has decided to locate in Greenfield and will build a 100 x 100-foot factory on Wells street.

HAVERHILL, MASS.—The Burgess, Lang Co., 50 State street, Boston, is about to start work on the construction of an 8-story and basement, 55 x 400-foot factory building here, to cost about $150,000.

HOLYOKE, MASS.—Plans are being drawn for a plant for the Cowan Truck Co., maker of Cowan transveyors, on Water street, Riverside.

HULL, MASS. — The Rockland house, one of the largest summer hotels at Nantasket beach was seriously damaged by fire, causing a loss of $150,000. It will be rebuilt.

LAWRENCE, MASS. — Geo. E. Kunhardt, Union street, will build a 2-story and basement, 60 x 125-foot mill. The engineer is Chas. T. Main, 201 Devonshire street, Boston.

LOWELL, MASS.—The Newton Mfg. Co. which is making ammunition, has secured additional buildings adjoining its plant and will increase its capacity.

LYNN, MASS.—Plans have been drawn for a 6-story, 50 x 110-foot addition to the plant of the Campbell Electric Co., Stewart street.

NEW BEDFORD, MASS.—The Rotch Mills have been incorporated; $450,000 capital stock; by Harold W. Brown, W. Rodman Peabody, Boston and Roscoe R. Storer, Boston.

NEWBURYPORT, MASS.—The Newburyport Building association is having plans drawn for a concrete, 3-story and basement, 50 x 90-foot factory building on Hale's court, which is to be leased by the N. D. Dodge Shoe Co.

NORTH GRAFTON, MASS.—John A. Bigelow, O. S. Ryerson and Edwin I. Horsan, all of Worcester, Mass., have bought the 2-story William Paton factory on Railroad street and will equip it for the manufacture of toys.

PEABODY, MASS.—The Turner Tanning Machinery Co. will build an addition to its factory.

QUINCY, MASS. — The Fore River Ship

Crown Ore from the Dean-Itasca Mine on the Mesabi Range

The ore is non-bessemer, of good coarse structure. Dean-Itasca mine shipments for 1915 were 486,374 tons, mostly since August 1. For 1916 they will be considerably greater.

A complete analysis of Crown Ore from Dean-Itasca Mine in natural state and dried at 212° Fahr.

	Dried 212°	Natural
Iron	59.67	51.5608
Phosphorus	.045	.0388
Silica	6.25	5.4006
Manganese	.59	.5098
Alumina	2.67	2.3071
Lime	.27	.2333
Magnesia	.18	.1555
Sulphur	.011	.0095
Volatile Matter	4.35	3.7588
Moisture	13.59	

Crown Ore Guarantee for 1916, 52.00 Per Cent Iron, Natural. Phosphorus, Dried .045.

The output of this mine during 1916, together with our five other mines, gives us an unusually large tonnage.

We are now taking contracts for this ore and will be glad to figure on your requirements for the coming season.

THE TOD-STAMBAUGH COMPANY

Perry-Payne Building

CLEVELAND :: :: :: :: OHIO

Building Corporation has decided to build a brick and steel, 3-story, 72 x 500-foot, woodworking shop to cost $300,000, as an extension to its big plant. In the spring it will build a double slip 800 feet long and capable of taking the largest battle cruiser.

SALEM, MASS.—The Helburn Leather Co. has awarded contract for a 3-story, 60 x 100-foot mill construction addition to its factory on Goodhue street.

SALEM, MASS.—The Hy-Grade Lamp Co., Danvers, Mass., is soon to move to a new factory on Boston street, this city. Its machinery will be motor driven.

WAKEFIELD, MASS.—L. B. Eveans Son Co. is to enlarge its shoe plant by the erection of a 2-story, 30 x 100-foot addition.

WAKEFIELD, MASS.—The New England branch plant of the Motor Tire Reconstruction Co., New York, is to be established in Wakefield. Thomas E. Dwyer, owner of the Lead-Lined Iron Pipe Co., is at the head of the company.

WARREN, MASS. — The warrant for the annual town meeting, Feb. 12, will contain an article as to the action the town will take in regard to bonds for $100,000 to install a public water system.

WORCESTER, MASS.—The Norton Co. is contemplating the erection of a power plant at its Greendale works.

WORCESTER, MASS.—The Norton Co. has awarded contract for a 1-story, steel, 32 x 52-foot roasting shed with a sheet metal roof, as an addition to its plant on New Bond street.

WORCESTER, MASS.—The John Bath Co., jigs, fixtures and gages, Osgood-Bradley building, will move its Southbridge plant to Worcester, thus doubling its capacity.

WORCESTER, MASS.—The Morgan Construction Co., is to erect a concrete, brick and steel, fireproof 3-story, 81 x 106-foot office building at the corner of Belmont and Carbon streets, the contract for which has been awarded the E. J. Cross Co.

WORCESTER, MASS. — Bickford & Sweet, slipper makers, are to erect a brick, mill construction, 5-story and basement, 40 x 56-foot factory building in the rear of their present 5-story factory, 60 King street, to cost about $30,000.

WORCESTER, MASS.—The city will shortly award the contract for the construction of a 6-span, 855-foot, 70-foot wide concrete bridge over Lake Quinsigamond, to cost $250,000, on the principal highway between Worcester and Boston.

HOPE, R. I.—The Hope Co. has completed plans for a 230 x 264-foot extension to its factory to cost $130,000.

NEWPORT, R. I.—Plans are ready to estimate for a brick and stone, 3-story and basement home and a 1-story and basement chapel for children to cost $30,000 for the Cutting Memorial hospital on Spring street.

PROVIDENCE, R. I.—The Ashmunsen Mfg. Co., formerly located in New York, is now engaged in aeronautic engine building at Providence. The product includes all makes of air craft. A new design known as the military tractor has also been developed.

PROVIDENCE, R. I.—Plans are being prepared for a 15-story hotel on Dorrance street to be operated by the United Hotels Co.

PROVIDENCE, R. I.—An act will be introduced into the general assembly this month asking for an appropriation for a new court house for Newport county.

PROVIDENCE, R. I.—Plans are being figured for a brick and concrete 1-story, 64 x 75-foot addition to No. 5 building of the Brown & Sharpe Mfg. Co.

PROVIDENCE, R. I.—The Witt Oil Burning Equipment Co. has been incorporated to deal in pumps and machinery; $50,000 capital stock; by William H. Hamlyn, William H. Hamlyn Jr. and Lillian G. Hamlyn.

BRIDGEPORT, CONN. — The Lindstrom Tool, Die & Gauge Co. has been incorporated; $20,000 capital stock; by F. L. Lindstrom, Ada Lindstrom and John J. Cass.

BRIDGEPORT, CONN. — The Connecticut By-Products Co., has been incorporated; $50,000 capital stock; by Kenneth W. McNeil and Willis G. Townes, Port Chester, N. Y.

BRIDGEPORT, CONN.—The Blue Ribbon Auto & Carriage Co. will erect a brick and steel, 3-story, 60 x 100-foot building in the rear of its present factory.

BRIDGEPORT, CONN.—The Stanley Bronze Co. will build a brick and steel, 40 x 150-foot factory on Holland avenue, its present plant having been sold for an extension of the New Haven railroad's freight yards.

BRIDGEPORT, CONN. — The American Graphophone Co., has sold $550,000 in bonds, the proceeds of which will be used to pay for the erection of a new building adjoining its present plant.

BRIDGEPORT, CONN. — The Bridgeport Hydraulic Co. has purchased the water rights, electric plant, leases and business of the Westport Water Co., and will conduct the business of that company.

BRIDGEPORT, CONN.—The United Illuminating Co. projects a large addition to its present electric lighting plant to include a steam-generating plant with a series of super-steam generators in a brick building to be an addition to the new ones completed last year. Erection of plants in other sections of the city are contemplated.

BRIDGEPORT, CONN. — The Precision Gauge & Tool Co., recently incorporated, expects to start business at 135 Cannon street, Feb. 1, if it can secure a sufficient number of machinists. The officers of the company are: G. O. Gabriel, president and treasurer; Rolland E. Norton, manager and Harold DeW. Hotchkiss, secretary.

BRIDGEPORT, CONN.—The Connecticut Alloyed Metals Co., recently formed with a capital of $50,000, has bought the United Foundry & Machine Co.'s plant and will engage in the manufacture of brass, bronze and other metals. It expects to have capacity for turning out 60 tons a day. The present factory is one story, 100 x 185 feet and the company will add a 90 x 100-foot structure to be completed in 60 days. Jas. G. McKay is general manager.

DANBURY, CONN. — Plans will be ready for estimates early in February for a brick mill construction, 3-story, 100 x 150-foot addition to the plant of the Rogers Silver Plate Co., Rowan street.

HARWINTON, CONN.—The Manufacturers Association of Naugatuck valley has had plans drawn for a reinforced concrete storage reservoir with a capacity of 3,500,000 gallons on Lead Mine brook. The project includes three dams and probably a power station.

MANSFIELD, CONN. — The state is to build six brick and concrete buildings to cost $200,000. Bidders are limited to Connecticut contractors.

NEW HAVEN, CONN. — Plans are being drawn for a brick and steel, 2-story and basement plant for the Harris & Hart Co. here.

NEW HAVEN, CONN.—The National Welding Co., Inc., has been incorporated; $10,000 capital stock; by John F. Shuford, M. A. Spanutius and Joseph Kurzweel.

NEW LONDON, CONN. — The Pequot Paper Co. has been incorporated; $100,000 capital stock; by George R. Thompson, Norwich, Conn.; Robert B. Harris, Arthur W. Lavalle, Roxbury, Mass.; Joseph H. Outlear, Boston, and C. Monroe Mason, Boston.

NORTH GROSVENOR DALE, CONN.—The Grosvenor Dale Co. has awarded a contract for a $30,000 power plant adjoining its mills. The three 1-story brick buildings will include a boiler house, 48.4 x 109 feet, a pump house, 19.10 x 51.8 feet, and a coal pocket, 40.8 x 22.8 feet. The project also includes a 200-foot radial brick stack, with concrete foundations.

PLAINVILLE, CONN. — Burton S. Clark, architect, 75 Pratt street, Hartford, is drawing plans for a 1-story and basement, 100 x 130-foot machine shop to be built in Plainville as soon as possible, for the Rockwell-Drake Co.

WATERBURY, CONN. — Plans have been drawn for a brick fireproof 3-story, 190 x 196-foot high school to cost $30,000 at Grove and Pine street, for the city.

WATERBURY, CONN. — The Waterbury Brass & Bronze Co. has been incorporated; $10,000 capital stock; by Henry L. Silver, Harry W. Even and Edward B. Riley.

WATERBURY, CONN.—The Chase Metal Works will begin work at once in the construction of a 1-story addition, 160 x 180-foot, with a 20 x 160-foot wing.

WATERBURY, CONN.—The Richards Mfg. Co., has been incorporated to make alloys, metals and novelties; $15,000 capital stock; by George J. Richards, James Power and Daniel J. Leary.

WHITNEYVILLE, CONN.—Plans are being figured for a group of buildings for the New Haven orphan asylum to be erected here at a cost of $100,000. The main building will be of brick and stone, two stories, 77 x 152 feet, in addition to which there will be six cottages, a large stable and storehouse.

Along the Middle Atlantic Seaboard

ALBANY, N. Y.—W. W. Wotherspoon, superintendent of public works, Capitol building, will receive bids until Feb. 16 for contract No. 122, Erie canal, section 4, for constructing the superstructure, substructure and approaches of the highway bridge over the Mohawk river, near Little Falls, N. Y.

BROOKLYN, N. Y. — The Suffern Engineering Corporation, 149 Broadway, New York, has completed plans for a 3-story extension to the plant of the Iron Clad Mfg. Co., 929 Flushing avenue, Brooklyn.

BROOKLYN, N. Y. — Manhattan Beach Three Cent Line, 333 Gold street, will receive bids for the erection of a 1-story, 21 x 22-foot steel tower at Front street and Manhattan bridge pier. Carrere & Hastings, 52 Vanderbilt avenue, New York, are the engineers.

BROOKLYN, N. Y.—The Becker Analine & Chemical Co., East Eighty-third street, is having Benjamine Driesler, architect, 153 Remsen street, draw plans for a 3-story, 40 x 80-foot chemical factory.

BUFFALO, N. Y.—The Atlas Steel Casting Co., Elmwood avenue and the Erie railroad, will build a 1-story steel and brick addition to its foundry.

LONG ISLAND CITY, N. Y.—Wm. Higginson, architect, 17 Park Row, New York, is taking bids on the construction of a 3-story, 100 x 400-foot factory building in Long Island City, for the Degnon Realty & Terminal Improvement Co. The building is to be leased by the Rome Metallic Bedstead Co., 149 Broadway, New York.

NEW YORK.—Emanuel Sommer, architect, 220 Broadway, is taking bids on a 2-story, 100 x 120-foot factory building, to be erected for the Meister Builders, 220 Broadway.

ROCHESTER, N. Y.—The Bausch & Lomb Optical Co. will build a factory, 133 x 222 feet, to take the place of a building recently damaged by fire.

ROCHESTER, N. Y.—The city will build a garbage disposal plant to be composed of a 40 x 189-foot power plant, a screen room, machine shop and other buildings. Plans for the building have been almost completed by C. M. Hirschfelder, 62 State street, Rochester, the architect. E. A. Fisher is the consulting engineer.

SYRACUSE, N. Y.—The Lewis-White Co. has been incorporated to deal in machinery and appliances; $5,000 capital stock; by G. W. Fox, W. Plant and C. Whiting, Canastota, N. Y.

WHITE PLAINS, N. Y.—Engineer Chas. McDonald, Realty building, has plans in progress for a bridge to be erected at Harmon, N. Y., at a cost of about $40,000.

BAYONNE, N. J.—Electro-Dynamic Co., Avenue A, electric motors, etc., has let a contract to the John W. Ferguson Co., Paterson, N. J., for a 2-story, 100 x 100-foot factory addition.

BOONTON, N. J.—Acme Mfg. Co. has been incorporated to deal in iron, copper and steel; $75,000 capital; by John McLaren, F. B. Knowlton, E. M. Beyl, all of New York City.

CALIFON, N. J.—Acme Land & Chemical Co., recently incorporated with $50,000 capital, will build a factory in Califon.

CAPE MAY, N. J.—The Midvale Steel Co., Philadelphia, has leased the Camp farm along the Delaware river with the privilege of buying it. The Midvale company will erect a plant and use some of the territory for proving grounds.

CHRONE, N. J.—E. C. Klipstein & Sons Co. has been incorporated to manufacture chemicals; $100,000 capital; by Ernest C. Klipstein, Ernest H. Klipstein, Gerald P. Klipstein, East Orange.

ELIZABETH, N. J.—The Borne, Schrymser Co. has taken out a permit to erect a plant of six buildings on South Front street, to cost $58,400. The main plant will be 170 x 191 feet. Reinforced concrete will be used in all the structures.

ELIZABETH, N. J.—The Ring, Cleaves, Graham Co., architect and engineer, 280 North Broad street, is getting ready to let contracts for the erection of the buildings which will constitute the new ship building plant of the Samuel L. Moore & Sons Corporation at Elizabethport. Bids are being taken on the construction of pattern and storage buildings, to cost about $25,000. Plans for a $75,000 foundry extension, shortly will be ready for estimates. The plans for plate and fabricating shops, an office building and six cradles have not yet been completed.

GIBBSTOWN, N. J.—The Du Pont Powder Co. will erect 30 more buildings on the Green farm, recently purchased, and will begin manufacture of caps and fuses in some of the structures.

GLOUCESTER CITY, N. J.—The J. M. Rogers Works, Inc., has received bids on the construction of a 45 x 122-foot, 1-story machine shop.

HOBOKEN, N. J.—Dodge & Seymour, Ltd., has been incorporated to deal in machinery and hardware; $150,000 capital; by C. A. Dodge, Henry T. Dodge and Charles B. Burkler, Brooklyn.

HOBOKEN, N. J.—The Hoboken Construction Co. has been incorporated to construct buildings; $50,000 capital; by Carl Herbert Manasquan; John Young and Edward A. Markley, Jersey City.

HOBOKEN, N. J. — The Delaware, Lackawanna & Western railroad, has plans in progress by its architect, F. J. Nies, and its engineer, T. J. Ray, for a ferry terminal to be constructed in Hoboken. Beside remodeling the piers and making other improvements, a boiler house and machine and carpenter shops, will be constructed.

IRVINGTON, N. J.—Walter A. VanNess, 220 Broadway, New York, has let a contract to A. A. Streyker, Newark, N. J., for the construction of a 2-story, 40 x 80-foot factory in Irvington.

IRVINGTON, N. J.—Fred A. Phelps, architect, 9 Clinton street, Newark, N. J., is receiving bids on the construction of a 1-story tool factory addition to be built for the Irvington Mfg. Co., Coit street, at a cost of about $10,000.

JAMESBURG, N. J.—The Lake Ruth Mfg. Co., whose plant at Autcalt was damaged by fire, will build a factory in Jamesburg.

MILLVILLE, N. J.—The Caloris and International Glass companies, owned by Philadelphia capitalists, have had plans prepared for 50 dwellings.

NEWARK, N. J.—The Gannon Meter Co. will enlarge its factory building at a cost of about $2,000.

NEWARK, N. J.—Jas. M. Seymour has been granted a permit to enlarge his factory building at 115 Mechanic street.

NEWARK, N. J.—The Arcand Realty Co. has been granted a permit to erect a 1-story brick factory building at 67-71 Gobel street.

NEWARK, N. J.—D. B. Dunham & Son have leased property at 359 Halsey street and will manufacture automobile bodies after some alterations to the buildings are made.

NEWARK, N. J.—Felzenberg Bros. have leased a factory building at 91 Mechanic street, where they will manufacture gas and electric fixtures.

NEWARK, N. J.—The Central Railroad of New Jersey has plans drawn for the new Broad street terminal station and work will begin early in the spring.

NEWARK, N. J. — The National Marine Motor Co. has been incorporated to build marine motors and other machinery; $50,000 capital; by Reuben H. Lindley, Arthur Gross and Louis Gross, Newark.

NEWARK, N. J.—N. M. Shoemaker, architect and engineer, 9 Clinton street, is about to take bids on the construction of a tool factory to cost about $75,000 to be erected at Bloomfield, N. J., for the Eastern Tool & Mfg. Co. A. G. Anderson, 74 Richmond street, Newark, is president of the latter concern.

NEW BRUNSWICK, N. J. — The Howe Rubber plant on Somerset street was damaged by fire, causing a loss of more than $150,000. The fire was caused by the explosion of a boiler.

NORTH BERGEN, N. J. — International Concrete Construction Co. has been incorporated to erect concrete structures; $100,000 capital; Garret N. Banker, New York; John Murphy, I. S. Ross, Brooklyn.

ORANGE, N. J. — Lewis W. Butterfield Heating Co. has been incorporated to deal in heating and tinning apparatus; $125,000 capital; by Lewis W. Butterfield, George I. Butterfield, William A. Calhoun, Orange.

PARLIN, N. J.—The Union Powder Co. has purchased an additional site of approximately 17 acres in Sayreville township, and will add buildings to its plant at a later date.

PASSIAC, N. J.—Edward McLean, of the McLean Co., has purchased the plant of the United States Finishing Co. The new company will shortly put the plant in operation.

PERTH AMBOY, N. J.—The Perth Amboy Mfg. Co. will erect a new factory.

PERTH AMBOY, N. J.—The Central railroad of New Jersey, will erect a steel bridge over Garretson avenue, to cost $36,000.

PERTH AMBOY, N. J. — Perth Amboy Chemical Co. will erect a new addition to cost $7,000. The General Bakelite Co. will erect two steel and corrugated iron buildings.

PHILLIPSBURG, N. J. — The Ingersoll-Rand Co., manufacturers of air compressors and rock drills, has filed a certificate with the secretary of state increasing its capital stock from $15,000,000 to $20,000,000.

PLAINFIELD, N. J.—Ryder & Graves Electrical Co. has been incorporated to do mechanical engineering; $25,000 capital; by Charles L. Ryder Jr., George F. Graves, Plainfield; Frank Jennings, Jamesburg.

ROSELLE, N. J.—The Central railroad of New Jersey will erect a steel span across Locust street to cost $16,000.

ARDMORE, PA.—The Auto Car Co. plans to build a 3-story, 275 x 300-foot addition to its plant.

BALD EAGLE (BLAIR CO.) PA.—The Pennsylvania railroad has received permission from the state water commission to build a bridge over Little Bald Eagle creek.

BEAVER, PA.—The Pittsburgh Tool Steel Wire Co. has purchased additional land from the Colonial Land Co. at Monaca, for future extensions.

BRADFORD, PA. — The Foundry of Boviard & Co., Davis street, badly damaged by fire. An adjoining machine shop also was slightly damaged.

GARRETT, PA.—The Baltimore & Ohio railroad has received permission from the state water commission to erect a bridge over Buffalo creek, east of Garrett, in Somerset county.

GREENSBURG, PA. — The Manhattan Woolen Mills Co., recently incorporated with $100,000 capital stock, plans to erect a factory. George F. Evans, Greensburg, is interested.

JOHNSTOWN, PA.—The application of the city to construct a bridge across Stoney creek at Horner street has been approved by the state water commission.

JOHNSTOWN, PA.—The Cronger Co. has been incorporated for the manufacture of a graphite lubricator; $15,000 capital stock; by Bruce H. Campbell, Clinton R. Stewart and Adolph Raab.

NEW CASTLE, PA.—The Johnson Bronze Co. is erecting an addition to its plant to provide for an increase in capacity.

PHILADELPHIA. — The Barrett Mfg. Co., Thirty-sixth street and Gray's Ferry road, has taken bids on the construction of a 3-story condenser building, 30 x 53 feet.

PHILADELPHIA.—Morganthaler Bros. are receiving bids for the construction of a 2-story brick and concrete machine shop, 36 x 40

feet, to be located near Second and Jackson streets.

PHILADELPHIA.—Wm. Steele & Sons Co., architects, 1600 Arch street, have plans in progress for a 1-story, 70 x 100-foot plant to be built by the Air Reduction Co.

PHILADELPHIA.—The Schaum & Uhlinger Co., American and Glenwood avenues, will build a 3-story, 136 x 175-foot machine shop. Bids have been received by Wm. Steele & Sons Co., 1600 Arch street.

PHILADELPHIA.—The Schutte & Koerting Co., Twelfth and Thompson streets, is having plans prepared by Chas. A. Blatchley, architect, Drexel building, for a 1-story, 50 x 80-foot factory addition.

PITTSBURGH.—The Westinghouse Electric & Mfg. Co. is buying milling machines for installation in its plants for finishing shells.

PITTSBURGH. — The Goodman Engine & Machine Co. has been incorporated; $45,000 capital stock; James Hogan is treasurer.

PITTSBURGH.—The W. G. Wilkins Co. is preparing plans for an addition to Battery B armory in the East End.

PITTSBURGH.—Golden & Crick will build a 3-story reinforced concrete garage on Senate street.

PITTSBURGH. — Citizens of Braeburn and Natrona are urging the county commissioners to build a bridge over the Allegheny river between the two towns. Two years ago plans were prepared for a $225,000 structure, but the project was delayed.

PITTSBURGH.—The W. R. Miller Co. has been incorporated to design and erect furnaces, mills and manufacturing plants; $5,000 capital stock; by W. R. Miller, J. Murray Miller and James C. Miller, Boggs avenue, Pittsburgh.

RITTERSVILLE, PA.—The Roller Smith Co. has started work on the construction of a 3-story, 30 x 100-foot addition.

SHARON, PA.—The Sharon Foundry Co., with works at Wheatland, Pa., is increasing the capacity of its steel foundry.

SHARON, PA.—The application of commissioners of Mercer county to construct a steel bridge across the Shenango river at State street has been approved by the state water commission.

SHARON, PA.—The Sharon Foundry Co., with works at Wheatland, Pa., is increasing the size of its steel foundry which will be 30 x 100 feet when completed. The contract for the extension has been awarded to William Fleming & Sons, New Castle, Pa.

SHARON, PA.—John Stevenson Jr. is interested in a proposed plant for the manufacture of steel barrels. No definite plans have been decided and it will be a year before the plant is completed, Mr. Stevenson says.

WARREN, PA.—The borough of Warren is considering the erection of a steel bridge over the Allegheny river.

WARREN, PA.—The Crescent Furniture Co. has been incorporated to manufacture furniture from metal and wood; $12,500 capital stock; by H. V. Hazeltine, Charles Forsgen and P. L. Davis.

WASHINGTON, PA.—A $50,000 addition to the county home will be erected.

ZELIENOPLE, PA.—The Herman Pneumatic Machine Co. is remodeling its power plant for machine shop purposes and has added some new machinery. Robert E. Ringle is manager of the company.

BALTIMORE, MD.—J. S. Young Co., Boston street and Lakewood avenue, is receiving bids for the construction of an engine and mill building.

BALTIMORE, MD.—The Baltimore Copper, Smelting & Rolling Co., Keyser building, has let to the McClintic-Marshall Co., a contract for the steel for a 1-story factory addition to cost approximately $10,000.

BALTIMORE, MD.—The Hess Steel Corporation, Witherspoon building, Philadelphia, is having plans prepared by Blanke & Zink, architect, Equitable building, Baltimore, for the construction of a 1-story, 30 x 31-foot factory building and a 1-story, 13 x 24-foot transformer building.

Activities in the Central States

CINCINNATI.—The Fosdick Machine Tool Co. has purchased six lots adjoining its plant. An addition may be built in the near future, but definite plans have not been published.

CINCINNATI.—The Oesterlein Machine Co. has decided to go ahead at once with the erection of a building. A site was purchased several months ago on Colerain avenue. Zettle & Rapp, architects, have been commissioned to prepare plans.

CINCINNATI. — The Wray-Chase Motor Co., recently incorporated at $100,000 will build a modern garage with a capacity of 1,000 automobiles. Light repair equipment will be needed. J. Morris Wray is president and general manager.

CINCINNATI.—The Rapid Electrotype Co. will erect a new factory building 175 x 300 feet, which will be two stories in front and one story in the rear. A site costing $30,000 has been purchased on McMicken, near Race street. The cost of the building will be $50,000.

FAIRPOINT, O.—The Fairpoint & West Virginia Coal Co. is inquiring for motor generating sets and a 5-ton haulage motor, relaying rails and electric cable.

IRONVILLE, O. — A branch plant of the Barrett Roofing Co. is to be built at Ironville. The concern utilizes by-products from coke ovens and oil refineries and the local plant will use products from the new coke ovens of the Toledo Furnace Co., and the Paragon Oil & Refinery Co. The main plant and offices of the concern are in Battery Place, New York City. A tract of nine acres on the Wheeling & Lake Erie has been purchased.

NILES, O.—The Grasselli Chemical Co., Cleveland, has purchased 150 acres, near Niles, and will erect a chemical plant.

TOLEDO, O.—The general contract for the Waldorf hotel, a 10-story fireproof structure to be built on Summit street, was recently awarded to the H. J. Spieker Co. The building will cost $250,000. It is estimated that about 400 tons of structural steel will be required for the building.

TOLEDO, O.—A $100,000 building is to be erected for the Champion Spark Plug Co., to increase the output to 100,000 spark plugs a day. A. Bentley & Sons Co. have the contract.

TOLEDO, O.—The Toledo Bottle Co. has been incorporated for $80,000 and work on a large plant for the concern will begin within a few days. The company has purchased an East Toledo site and will build its plant there.

CHARLESTOWN, W. VA.—The Norfolk & Western railroad will erect a new station at Blue Stone Junction. J. E. Crawford, Roanoke, Va., is in charge.

HARTFORD, W. VA.—Jackson Coal & Mining Co., E. A. Smith, purchasing agent is inquiring for stokers, stationary boilers and belt-driven pumps.

LEXINGTON, W. VA.—The Ruby Brand Pocahontas Coal Co. is in the market for storage batteries, a 3 or 4-ton mine motor, gasoline engine and dynamo for charging motor batteries.

PARKERSBURG, W. VA. — The Essen Glass Co. will build an addition to its plant.

WHEELING, W. VA. — The Marling Coal Co. has been incorporated; $25,000 capital stock; by J. C. McKinley, N. C. Hubbard, P. C. Christy, L. W. Brown and H. B. Lockwood.

WILLIAMSON, W. VA. — County commissioners of Mingo and Pike counties will build a steel and concrete bridge across Tug Fork of the Big Sandy river at Williamson.

ALEXANDRIA, IND.—The Zeigler Mfg. Co., recently noted as having taken over a plant in Alexandria for the purpose of manufacturing munitions advises that the concern is not engaged in the ammunition business, but is specializing in automobile axles, heavy steel stampings, screw machine and lathe products.

ANDERSON, IND.—The Climax Machinery Co. has been incorporated to manufacture machinery; $10,000 capital stock; by Frank C. Shimer and William W. Helm.

ANDERSON, IND.—The Miller Sales Co. has been incorporated to manufacture road machnery and other appliances; $50,000 capital stock; by Brooks E. Miller, Harry L. Miller and John B. Miller.

ANDERSON, IND.—The Kramer Vacuum Brake Co. has been capitalized at $25,000 to manufacture air brakes. The directors are Benjamin G. Kramer, N. M. McCullough and Fred E. Mustard.

BRAZIL, IND. — The Wood Turret Machine Co., David Wood, manager, will build a 1-story factory, 80 x 250 feet.

COLUMBUS, IND.—The Columbus Pump Co. has been incorporated to operate a foundry; by William Stables, William Summers and Charles Lensmith.

EAST CHICAGO, IND. — The Edward Valve & Mfg. Co. will build a 1-story addition, 40 x 40 feet.

EVANSVILLE, IND. — The International Steel & Iron Co., Oscar Oehlkuck, manager, Cleveland and Edgar streets, is to build a 1 and 2-story addition to its plant.

FORT WAYNE, IND.— William Johnson, county auditor, can furnish details regarding a steel bridge which will be built over Spy Run creek at Fourth street at an estimated cost of $7,000.

HUNTINGTON, IND.—The Sterling Metal Co., which was recently incorporated, has bought a 2½-acre tract on which it will erect its plant, the initial unit being 75 x 150 feet, two stories, of steel and glass.

INDIANAPOLIS, IND. — Bids will be received until Feb. 23 by L. K. Fesler, county auditor, for a steel plate girder bridge on National road over Lick creek, Wayne township.

INDIANAPOLIS, IND.—The Heaton Engine Co. has been capitalized for $20,000 to manufacture engines. The directors are Otis Heaton, T. H. Johnson and A. M. Burke.

The Engineering Investment Co. is the local representative of the concern.

INDIANAPOLIS, IND. — The Convertible Auto Body Mfg. Co. has been incorporated to manufacture automobile seats; $25,000 capital stock; by B. F. Cartwright, William Cornwell and Jenny Cartwright.

KOKOMO, IND.—Plans are being prepared by R. L. Young, architect, Johnson building, for a 3-story warehouse, 100 x 114 feet for the Standard Sanitary Mfg. Co. to cost $50,000.

LOGANSPORT, IND.—The Logansport Machine Co. has been capitalized at $6,000 to manufacture machinery. The directors are William Ball, Paul Kasch and Frank B. Wilson.

MADISON, IND.—The Tower Mfg. Co. will install additional machinery for manufacturing carpet tacks.

NEW CASTLE, IND.—The city council is planning to make improvements and additions to the municipal electric light plant at a cost of $40,000.

CHICAGO. — The Humboldt Iron Works, 1117 North Western avenue, has been incorporated; $5,000 capital stock; by Samuel Adams, Jacob Stein and Morris Glazer.

CHICAGO.—The Federal Tool Co. has been incorporated; $5,000 capital stock; A. N. Outten, M. C. Kennicott and George W. Engles, 2212 Lincoln avenue.

CHICAGO.—The Consolidated Engineering Co., 507 West Jackson boulevard, is taking bids on a factory building, one story, 85 x 133 feet, to cost $15,000.

CHICAGO.—The Cyclone Blow Pipe Co. will build a 1-story factory at 2542 West Forty-first street, to cost $20,000. C. R. Witherspoon is the architect.

CHICAGO.—Public Service Co. of Northern Illinois, 72 West Adams street, will install a steam power plant at Brandon, near Joliet, entire plant to cost $1,000,000. Contracts for the structural steel have been let.

CHICAGO.—The Smith Form-A-Truck Co. has leased from the Clearing industrial district a factory building to cost $80,000 on a site 375 x 669 feet at West Sixty-fourth street and South Forty-eighth avenue, for a term of 20 years.

ELDORADO, ILL.—The Morris Automatic Pump Co. has been incorporated; $15,000 capital stock; by Guy S. Martin, Samuel H. Latham and E. H. Morris.

JOLIET, ILL.—The Joliet & Eastern Traction Co. will build a line from Joliet to Hammond, Ind.

LA SALLE, ILL.—The La Salle Carbon Coal Co. is inquiring for asbestos protected galvanized corrugated iron and ingot iron.

ANN ARBOR, MICH.—The Hoover Steel Ball Co. will build an addition to its forge and grinding shops, one story, 40 x 170 feet, and two stories 40 x 125 feet, and an office building, at a cost of $70,000. Construction will be brick and steel.

BATTLE CREEK, MICH. — The Union Steam Pump Co. has increased its capital stock from $600,000 to $1,000,000. Considerable machinery will be purchased to increase its facilities.

BAY CITY, MICH.—The Farmers' Auto & Machinery Co. is building a plant 150 x 200 feet.

BENTON HARBOR, MICH. — The Covel Mfg. Co., manufacturer of saw machinery, is building an addition to cost $15,000.

DETROIT.—The Standard Motor Truck Co. will build a 3-story addition, 125 x 150 feet.

DETROIT.—The Turner & Moore Mfg. Co., builder of large automobile parts, is having plans prepared for a factory, 75 x 300 feet, and will need power equipment and machinery.

DETROIT.—The American Auto Trimmings Co. is building a 5-story reinforced concrete plant at a cost of $45,000.

DETROIT.—The Long Mfg. Co., maker of automobile radiators, will build an addition to its plant.

DETROIT. — The National Twist Drill & Tool Co. has let a contract for a 4-story addition.

GRAND RAPIDS, MICH. — The Grand Rapids & Indiana railroad is about to buy about $10,000 worth of machine tools. H. Sullivan, Grand Rapids, is purchasing agent for the railroad.

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P. G. Dunham, Windsor hotel, Montreal, Que., will purchase one 200-horsepower engine and one 200-kilowatt, 220-volt generator.

The Midvale Steel & Ordnance Co., Philadelphia, is taking bids on 20 5-ton electric traveling cranes.

The Southern Pacific railroad, I. O. Rhodes, general purchasing agent, Flood building, San Francisco, Cal., is taking bids on a 50-ton, double-trolley, 6-motor crane with a 64-foot span.

The Ruby Brand Pocohontas Coal Co., Lexington, W. Va., is in the market for storage batteries, a 3 or 4-ton mine locomotive, a gasoline engine and dynamo for charging motor batteries.

The Pittsburgh Model Engine Co., with works near East Liberty station, Pa., has concluded the purchase of about 100 machine tools and is in the market for considerable additional equipment.

The Carnegie Steel Co., Pittsburgh, is asking for preliminary bids on rolling mill equipment for installation in its new plant at McDonald, O., which will house 10 bar and hoop mills. There will be 20 bar mill cranes purchased.

The Turner & Moore Mfg. Co., Detroit, builder of large automobile parts, is having plans prepared for a 75 x 300-foot factory and will be in the market shortly for power equipment and machinery.

The Fairport & West Virginia Coal Co., Fairport, O., is inquiring for motor generating sets and a 5-ton hauling motor as well as for relaying rails.

The Jackson Coal Mining Co., E. A. Smith, purchasing agent, Hartford, W. Va., is in the market for mechanical stokers, stationary boilers and a belt-driven pump.

HIGHLAND PARK, MICH.—Two pumping engines to cost $1,700 each will be installed at the Deqindre street station.

KALAMAZOO, MICH.—The G. T. Eames Co. has been incorporated to conduct the business of Gardner T. Eames, manufacturer of mechanical devices; with $10,000 capital stock. A foundry 80 x 150 feet will be erected.

MADISON, WIS. — Contracts have been awarded by the French Battery & Carbon Co., Madison, for the construction of a plant to replace the factory damaged by fire in December. The work will be executed by the Worden-Allen Co., Milwaukee and Chicago. Plans call for a fireproof brick and steel building on concrete foundations, 170 x 225 feet, providing about 45,000 square feet of floor space. J. B. Ramsey is president.

MANITOWOC, WIS.—The annual report of Bruno Dalwig, president and manager of the Wisconsin Aluminum Foundry Co., Manitowoc, Wis., indicated the need for an addition to the foundry, which was authorized. The building will be 60 x 140 feet in size, and will be undertaken later in the year. During the last year, the company purchased the Sheboygan Falls Machine Co., Sheboygan Falls, Wis., and consolidated the works at Manitowoc.

MILWAUKEE. — The Heating & Power Equipment Co. has been incorporated; $1,000 capital stock; by F. C. Hutchinson, W. E. Atwater and A. B. Nichols Jr.

MILWAUKEE. — The Northwestern Bridge & Iron Co., 127 South Water street, has been awarded the steel work for the plant of the Fitzsimmons Steel Products Co. on Park street.

MILWAUKEE.—The Milwaukee Structural Steel Co. has been awarded a contract for the steel work on a 4-story addition to the present 4-story factory of the Harsh & Edmonds Shoe Co., Hanover street. Herman J. Esser, 402 Camp building, is the architect.

MILWAUKEE.—The department of public works is preparing a call for bids for a 2,500-foot extension to the municipal, waterworks intake in Lake Michigan at Linnwood avenue. The estimated cost is in excess of $350,000. Fred G. Simmons is commissioner of public works.

MILWAUKEE.—The Raulf Co., 53 Patton building, which was awarded a contract for designing and erecting a new electric steel foundry for the Electric Steel Casting Co., West Allis, is taking bids for material, including steel columns and trusses, sash, lockers, etc. The building will be 80 x 300 feet. Leo G. Smith, president, 725 Superior street, is making arrangements for the purchase of the equipment, which will include a 3-ton electric furnace; two 3-ton wall cranes; one 10-ton inside traveling crane, and two 10-ton yard cranes. It is planned to have the foundry ready for operation by April 15 or May 1.

RACINE, WIS.—The J. J. Gardner Co., Bolivar, Pa., has been awarded a contract for the equipment of a $25,000 addition to the retort house of the Racine gas works of the Wisconsin Gas & Electric Co. The building will be erected by A. Jacobsen, Racine. It will be of brick and steel, 65 x 80 feet.

MT. VERNON, MO.—Albert C. Moore, Joplin, Mo., has been commissioned to prepare plans for a municipal electric light plant and extensions to the water works system. An election will be held soon to vote on issuing $15,000 in bonds to meet the expense.

ST. LOUIS, MO. — The Gor-Wes Motor Patents Co. has been incorporated to manufacture internal combustion engines; $50,000 capital stock; by Robert Gordon, B. H. Weston and Wyman C. Herbert.

ST. LOUIS, MO.—The St. Louis Sectional Garage Co. has been incorporated to manufacture portable metal garages; $15,000 capital stock; the company will equip a plant for manufacturing its product.

SIOUX CITY, IA. — The Sealwel Piston Ring Co. has been incorporated to manufacture automobile accessories; $25,000 capital stock; by William S. Warfield, Milton S. Crandall and B. A. Walrath.

In the South and Around the Gulf

BIRMINGHAM, ALA. — The Derailment Brake Co. has increased its capital stock from $2,000 to $100,000 and will remove its home office from Cullman to Birmingham.

SPARTA, MISS. — Bids will be received soon by George Stevens, chairman of the county board, Sparta, on a central heating and power plant, one story, 40 x 60 feet, to cost $20,000. Parkinson & Dockendorff, Linker building, La Crosse, are the architects.

BRISTOL, TENN.—The Southern Zinc & Mining Co., of New York, is planning to establish a zinc mine and concentrating plant on property in Sullivan county, Tenn., with headquarters for operating purposes in Bristol. J. H. Banks, mining engineer, 61 Broadway, New York, is handling the proposition.

CAMPBELLSBURG, KY.—Louis Coblin has information regarding the establishment of an electric light plant by a local company, which is shortly to secure a franchise.

CHATTANOOGA, TENN. — The Casey-Hedges Co. will build an addition to its plant. The company builds boilers. Charles E. Bearden, First National Bank building, Chattanooga, is the architect.

CHATTANOOGA, TENN. — The Tennessee Stove Works will build three brick buildings, for foundry, nickel-plating and storage purposes, respectively. J. L. Caldwell is president. The cost of the improvements will be $40,000.

CLARKSVILLE, TENN.—A. L. Peay and others are planning the reorganization of the Clarksville Street Railway Co., involving the installation of new equipment and a general improvement of the property.

DANDRIDGE, TENN.—John A. Walker has purchased an electric light plant, and is planning the development of a local water-power project in connection with the plant.

KNOXVILLE, TENN. — Mayor John E. McMillan is investigating plans for the establishment of a municipal electric light plant at a cost of $300,000.

KNOXVILLE, TENN.—The John G. Duncan Co. will purchase a second-hand high-pressure horizontal return tubular boiler with a capacity of 150 horsepower.

MEMPHIS, TENN.—The Virginia Bridge & Iron Co. has the contract for the steel work to be used in the new shops of the Southern railroad at Coster, Tenn., and the material will be fabricated at Memphis. The Coster shops will be of steel construction, and equipped with overhead cranes, as well as machine tools.

OLIVER SPRINGS, TENN.—William Tedder has purchased a local machine shop and will enlarge it. Equipment for repairing coal-mining machinery will be installed.

CRAB ORCHARD, KY.—An electric light plant will be installed by H. G. Skiles and Morris Perkins. A franchise for its operation will be offered March 7.

FRANKFORT, KY.—The American Chemical & By-products Co. has been incorporated in Delaware; $3,750,000 capital stock. A plant will be erected for the manufacture of chemicals. Ben D. Williams, Frankfort, is interested.

HARTFORD, KY.—The Kentucky Light & Power Co. is planning enlargements in its local plant. A. E. Barrass is manager, in charge of the improvements.

LONE OAK, KY.—S. M. Ware & Son will establish an electric light plant in connection with their present power house.

LOUISVILLE, KY.—The Adler Piano Co. is spending $15,000 in enlarging its factory buildings and will probably purchase additional equipment.

LOUISVILLE, KY.—The Illinois Central railroad, with general offices in Chicago, will build a round house, planing mill, etc., in Louisville, and also improve its track facilities.

LOUISVILLE, KY.—The C. Lee Cook Mfg. Co., which has begun the manufacture of lathes, in addition to metallic steam packing, has installed additional machinery and will make a permanent feature of the lathe business.

MAYSVILLE, KY.—The Maysville Cotton Mills will spend $25,000 in the purchase of equipment for the manufacture of coarse yarn products. The building to house the machinery has been completed.

MT. OLIVET, KY.—Dr. W. S. Chandler is planning the construction and equipment of an electric light and power plant and the establishment of a street lighting system.

NICHOLASVILLE, KY.—The Nicholasville Waterworks Co. will enlarge capacity.

OWENSBORO, KY. — The Hull Pump & Tank Co., recently noted as incorporated with $100,000 capital stock, proposes to establish a plant for the manufacture of pumps and tanks. The company will be in the market in about 10 days for the following equipment: Lathes, boring mill, drill presses, gear cutters, punches, rolls and riveters.

WHITESBURG, KY.—J. J. Bell, of Lexington, Ky., is planning the establishment of an electric light plant and water system.

WINCHESTER, KY.—The Premier Mfg. Co., of which W. L. Cotton is general manager, is purchasing power and special equipment for its garment factory.

NEW ORLEANS, LA. — The Arkansas & Louisiana Midland railroad, newly incorporated, will build a line from Monroe, La., to Crossett, Ark. Edward Ford, New Orleans, is president of the company.

McALLEN, TEX.—McAllen's Public Service corporation has let a contract for the erection of a brick building for the electric light plant. The company has announced that it will spend about $25,000 for machinery.

CLEVELAND, OKLA.—Plans and estimates are being prepared by Albert C. Moore, Joplin, Mo., for a water works system, including a dam, filtration plant, pumping machinery, elevated tank and mains, at a cost of $125,000.

OKMULGEE, OKLA. — The United Structural Sheet Metal Works will build a factory, two stories, 90 x 150 feet, to cost $15,000, from plans drawn by B. C. Overton of Okmulgee.

Pacific Coast and Western Canada

BANNING, CAL.—The Banning Water Co. will install an electrically operated pumping plant and otherwise develop the water system. Bonds for $80,000 have been sold.

LOS ANGELES, CAL. — The Blaw Steel Construction Co., Pittsburgh, has been given the contract for 277 steel transmission towers for the city, at a cost of $52,365.

OAKLAND, CAL.—The board of supervisors of Alameda county, is preparing to build a bascule bridge between Oakland and Alameda.

SIERRA MADRE, CAL. — The city of Sierra Madre is planning to make extensions to its water distributing system at a cost of $600,000.

BELLINGHAM, WASH. — County commissioners will build a steel bridge over Nooksack river at Marietta to cost $25,000. C. F. Adams is county engineer.

COLFAX, WASH.—The Colfax Iron Works will erect a new building in the spring.

DAVENPORT, WASH.—C. C. McCullough and L. C. Miner of Davenport have bonded three mines at Davenport to D. E. Moore, of Salt Lake City, for $20,000. Machinery will be installed.

PROSSER, WASH.—A petition has been presented asking for the construction of a municipal lighting plant. The cost of installing a 500-kilowatt generating plant is estimated at $12,500 and of transformers, distributing system, etc., at $12,500.

SEATTLE, WASH.—County Engineer A. P. Denton is preparing plans for a bridge at Stossel to cost $17,000 and a bridge at Fall City to cost about $35,000.

SEATTLE, WASH.—A contract has been awarded to Cray & Barash for the installation of a pumping plant and salt water mains for the natatorium at Second avenue and Lenora, at approximately $41,000.

SEATTLE, WASH.—Bids will be received by the board of public works until March 3, for the construction of the Lake Washington canal bridge, at Latona, to be of the steel bascule type. Structural steel to the amount of 256,900 pounds will be required for the substructure; 1,743,000 pounds for the superstructure; reinforcing steel for the substructure 255,000 pounds and machinery amounting to 232,000 pounds.

SPOKANE, WASH. — The Spokane Ornamental Iron & Wire Works at Stone and Sprague streets were seriously damaged by fire recently. Alfred H. C. Trepte is the president of the company.

SPOKANE, WASH.—It is reported that the Great Northern railroad will have its line from Spokane to Seattle electrified within two years. The General Electric Co. estimates the cost of the plant at Shelan Falls at $4,000,000.

ASTORIA, ORE.—The port commission will receive bids until Feb. 21 for the installation of machinery, shafting, belting, etc., in the grain elevator on the port of Astoria.

BEND, ORE.—N. H. Bogue, chief engineer for Robert Strathorn, has started a survey for the Oregon, California & Eastern railroad east of Bend.

OREGON CITY, ORE.—The Southern Pacific railroad will replace the 75-pound rails on the main line through the North Williamette valley with 90-pound rails. Work will probably start in the spring. H. D. Olson is the local agent.

PORTLAND, ORE.—Plans have been prepared for a 400-foot bridge over Balch Creek canyon to cost $135,000.

PORTLAND, ORE.—It is reported that the Pacific Coast Steel Co., of San Francisco, is considering the construction of a rolling mill in Portland.

PORTLAND, ORE.—The city engineer has completed plans for seven concrete viaducts over the Oregon-Washington Railway & Navi-

gation Co.'s tracks at a cost of $500,000, bids for which will be received about June 1.

PRAIRIE CITY, ORE.—The Prairie City Power Co. is planning to develop 1,000 horsepower from John Day river to be converted into electric current for light at a cost of $45,000.

PRINEVILLE, ORE. — The county will construct a steel bridge connecting the east and west sides of the Deschutes river at Bend, Ore. Robert B. Gould, deputy county surveyor, is preparing the plans.

ROSEBURG, ORE.—Bids will be received until March 6 by R. L. Whipple, city recorder, for the purchase of $100,000 railroad construction bonds of the city of Roseburg.

SPRINGFIELD, ORE. — The Southern Pacific railroad has begun a survey for a branch road from Cushman to Florence.

ST. HELENS, ORE.—Plans have been prepared by the state highway commission for a 100-foot steel bridge at Vernonia and a 60-foot steel bridge over Tide creek.

TRAIL, B. C.—The Consolidated Mining & Smelting Co., of Canada, Ltd., has increased its capital stock from $7,500,000 to $15,000,000.

VANCOUVER, B. C. — The American Can Co. has completed plans for the erection of an addition to its plant on Railway street, Vancouver. Construction work will cost about $70,000.

BRODERICK, SASK. — Robert Reid will purchase a screw-cutting lathe with about 18-inch swing, gap bed.

REGINA, SASK.—G. W. Mayer, vice president of the Imperial Oil Co., of Canada, Dominion Bank building, Toronto, Ont., has announced that the company will build a large refinery at Regina, Sask., and that the raw material to be manufactured at this plant will be brought by rail from the Wyoming fields to Plentigood by rail and a 160-mile pipe line will be constructed. The plant will cost about $1,000,000.

Western and Intermountain Territory

HALSTEAD, KAS. — The Arkansas Valley Interurban railroad will build car shops at Halstead at a cost of $15,000. Charles D. Bell, Wichita, is the chief engineer of the company.

HUTCHINSON, KAS.—The Solvay Process Co., Detroit, Mich., is planning an addition to its factory at Hutchinson at a cost of $50,000.

DEADWOOD, S. DAK. — Fire did about $5,000 damage to the foundry and blacksmith shop of James Hogarth.

ANACONDA, MONT.—The Anaconda Copper Co. will increase the capacity of its zinc concentrating plant and its new electrolytic zinc refinery at Great Falls. J. J. Carrigan is the head of the zinc mining department.

GREAT FALLS, MONT.—The Great Northern railroad, A. H. Hogeland, St. Paul, Minn., chief engineer, is considering establishing water softening plants, between Shelby and Billings at a cost of $6,000 each, with a $9,000 plant at Great Falls.

GREAT FALLS, MONT.—The mill to be erected by the Montana Flour Mills Co. in Great Falls will be of concrete and steel with brick walls. There will be ten steel elevators with capacity of 300,000 bushels. The company will erect 12 other elevators at points tributary to Great Falls.

FORT BENTON, MONT.—The Illinois Steel Bridge Co., Hutton building, Spokane, Wash., has been awarded a contract for furnishing 106,000 pounds of steel for a 180-foot span steel bridge over the Teton riven in Choteau county.

SUPERIOR, MONT. — The county commissioners have called an election for March 6 to vote on the question of $47,000 in bonds to construct a bridge at St. Regis and another at Cyr.

PUEBLO, COLO. — The Stearns-Rogers Foundry Co. is building an addition to its machine shop, 90 x 220 feet, to cost about $75,000.

HOLBROOK, ARIZ. — Bonds for $68,000 have been voted for a steel bridge. Charles E. Perkins is the county engineer.

BLACKFOOT, IDA.—F. M. Parkinson and H. M. Heimerding are interested in a plan to provide the city with a municipal lighting plant.

LEWISTON, IDA. — The Lewiston, Nez Perce & Eastern railroad has accepted the provisions of its proposed contract for water front property on Snake river to be used for terminal grounds and depot.

NAMPA, IDA.—It is stated that the Union Pacific railroad is considering the constructing of a 20-stall round house in Nampa to serve this section of the Oregon Short Line railroad.

New Business in Eastern Canada

WINNIPEG, MAN. — The Winnipeg Steamship Co., Ltd., has been incorporated to build and operate steamships, boats, docks, wharves, etc.; $100,000 capital stock; by Frederick W. Loutwood, Ernest A. Woodward. Thomas E. Meredith, all of Winnipeg.

AMHERSTBURG, ONT.—Mayor Auld of the town council is receiving prices and other information about transformers and switchboards, etc.

GANANOQUE, ONT.—The Steel Co., of Canada, Hamilton, Ont., has taken over the plant of the Gananoque Bolt Co., at Gananoque, Ont., and will install drop forging equipment.

CHATHAM, ONT.—Work is progressing on the erection of a sugar refinery at Chatham, for the Dominion Sugar Co., of Wallaceburg, Ont. When completed the plant will cost $1,000,000.

HAGERVILLE, ONT. — Frank Tyrrel is asking for prices on woodworking machinery, etc.

HAMILTON, ONT. — The Canadian Meter Co., Ltd., has been incorporated to manufacture meters, machinery apparatus and appliances, etc.; $200,000 capital stock; by John B. McNary, Edward H. Ambrose, John R. Marshall and others all of Hamilton.

KINGSTON, ONT.—The Mahood Drug Co., Ltd., has been incorporated to manufacture surgical and dental instruments, etc.; $50,000 capital stock; by George W. Mahood, John B. Phillips, George W. McGlynn and others of Kingston.

LONDON, ONT.—The Utilities Commission will purchase three 250-kilovolt-ampere transformers and switchboards for a transformer station. The chairman of the commission is P. Pocock.

OTTAWA, ONT.—The plant of Grant-Holden-Graham Co., Ltd., was seriously damaged by fire with a loss of about $50,000. The company manufactured clothing, tarpaulins, etc.

OTTAWA, ONT.—E. Robillard, Ltd., has been incorporated to build railways, water works plants, machinery, etc.; $100,000 capital stock; by E. Robillard, Hector Laperriere, Jean M. Lemieux and others of Ottawa.

PORT ARTHUR, ONT.—The Western Contracting Co. has been incorporated to construct railways, dry docks, buildings, etc.; $40,000 capital stock; by William F. Langworth, Alexander J. McComber, Etta E. Allen and others of Port Arthur.

PRESCOTT, ONT.—The Prescott Mfg. Co., has been incorporated to manufacture machinery, abrasive wheels, munitions, etc.; $200,000 capital stock; by John P. Dunne, James B. White, Michael J. Coffey and others of Prescott.

RIDEAU, ONT. — The Canadian Northern railroad will build a repair and car shops at Rideau, Ont. A. J. Ellis of Toronto is general superintendent.

ST. THOMAS, ONT. — The city of St. Thomas, Ont., will purchase two 750-kilovolt-ampere transformers, 3-phase. Superintendent is E. H. Coughell, City Hall, St. Thomas.

TORONTO, ONT. — The Canada Pipe & Steel Co., Atlantic avenue, will build an addition to its machine shop to cost $3,000.

TORONTO, ONT.—The Hamilton, Carburetor Co., 535 Queen street east, will build an addition to its factory.

TORONTO, ONT. — Wright & Co., 30 Mutual street, will purchase an electro-plating dynamo.

WINDSOR, ONT.—The Universal Stove & Furnace Co., is contemplating the erection of a factory at Walkerville or Windsor, Can.

MONTREAL, QUE.—P. G. Dunham, Windsor hotel, Montreal, will purchase one 200-horsepower engine, one 200-kilowatt, 220-volt direct current, generator.

MONTREAL, QUE.—The H. Muehlstein & Co. has been incorporated to manufacture rubber, machinery, etc.; $10,000 capital stock; by Francis E. McKenna, Joseph A. Perodeau, Paul S. Conroy and others, all of Montreal.

MONTREAL, QUE.—The Northern Electric Co., 121 Shearer street, is having plans prepared for the erection of a factory at Montreal, to be of steel and corrugated iron construction with concrete foundation.

MONTREAL, QUE.—A company in which C. Decarie, of the Imperial munitions committee, is interested, will build a factory in Notre Dame de Grace Ward, Montreal, for the manufacture of fuses, explosives, etc., to employ 3,000 men.

MONTREAL, QUE.—The Precision Tool & Machine Co., Ltd., has been incorporated to manufacture machinery, tools, arms, explosives, etc.; $50,000 capital stock; by John J. Meagher, Henry N. Chauvin, James E. Coulin, all of Montreal.

MONTREAL, QUE.—The Canadian Bronze Powder Works, Ltd., has been incorporated to manufacture bronze powders, metals of all kinds, machinery, tools, etc.; $500,000 capital stock; by Richard E. Thorne, of Westmount, Que.; Thomas B. Gould, Edwin Coughlan and others of Montreal.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery July 1.)

Bessemer, valley	$20.50 to 21.00
Bessemer, Pittsburgh	21.45 to 21.95
Basic, Pittsburgh	18.70 to 18.95
Basic, eastern Pa.	19.00 to 19.50
Basic, Buffalo	20.00
Malleable, Pittsburgh	19.45 to 19.95
Malleable foundry, Chicago	19.00
Malleable foundry, Philadelphia	20.50 to 20.75
Malleable foundry, Buffalo	18.00 to 19.00
No. 1X foundry, Philadelphia	20.50 to 20.75
No. 2 foundry, Pittsburgh	19.45 to 19.95
No. 2 foundry, Cleveland	19.30
No. 2 foundry, Ironton	18.00
No. 2 foundry, Chicago	18.50
No. 2X foundry, Philadelphia	20.00 to 20.50
No. 2X foundry, N. J. tidewater	19.75 to 20.50
No. 2X foundry, Buffalo	18.00 to 19.00
No. 2 plain, Philadelphia	19.50 to 20.00
No. 2 plain, N. J. tidewater	19.25 to 19.75
No. 2 plain, Buffalo	17.50 to 18.50
No. 2 southern, Birmingham	14.50 to 15.00
No. 2 southern, Cincinnati	17.40 to 17.90
No. 2 southern, Chicago	19.00 to 19.50
No. 2 southern, Phila. delivery	20.00 to 20.50
No. 2 southern, Cleveland	18.50 to 19.00
No. 2 southern, New York docks	18.50 to 19.00
No. 2 southern, Boston docks	18.25 to 18.75
No. 2 south. interior, New Eng.	18.50 to 19.50
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X furnace	18.00
Virginia 2X, Philadelphia	20.75
Virginia 2X, Jersey City	21.00
Virginia 2X, Boston points	21.25
Gray forge, eastern Pa.	18.50 to 19.00
Gray forge, Pittsburgh	18.95 to 19.45
Gray forge, Birmingham	14.00
Silveries, 8 per cent, Jackson, O.	25.00
Silveries, 8 per cent, Chicago	27.50 to 28.00
Low phos. Standard, Phila.	32.00
Low phos. Lebanon, Pa.	29.00 to 31.00
Low phos. Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	19.75 to 22.25
Charcoal, Buffalo	19.00 to 20.00
Charcoal, Birmingham	21.50

IRON ORE

Lake Superior Ores.

(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	$4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bess., 51½ per cent, ton	3.70
Mesabi non-Bess., 51½ per cent, ton	3.55

Eastern Ores.

(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit.	8.6c to 8.9 c
Local N. Y. and N. J. ores, unit.	8.5c to 8.75c
Port Henry lump, at mines, ton.	$4.00

Foreign Ores.

(Per unit Philadelphia.)

(Prices nominal.)

Foreign Bess., 50 to 65 per cent.	8 to 8½
For'n non-Bess., 50 to 65 per cent.	8 to 8½

COKE

(At the ovens.)

Connellsville furnace	$3.25 to 3.50
Connellsville fur., contract	2.50 to 3.00
Connellsville foundry	3.75 to 4.00
Connellsville fdy. contract	3.75 to 4.00
Wise county furnace, contract	2.85 to 3.10
Wise county foundry, contract	3.25 to 3.50
Pocahontas foundry, contract	3.00 to 3.25
Pocahontas furnace, contract	2.75 to 3.00
New River, foundry contract	3.50 to 3.75
New River, furnace contract	3.00 to 3.25

FERRO ALLOYS AND STEEL MAKING METALS

Ferro mang., delivered (prompt).	$175 to 200
Ferro mang., Balti., (future	125
Spiegeleisen 20 per cent, furnace	35.00
Ferro-silicon, 50 per cent, Phila.	83.00 to 85.00
Ferro silicon, 50 per cent, Pbgh.	83.00 to 85.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $27.00; 10 to 11 per cent, $28.00; 11 to 12 per cent, $29.00; 12 to 13 per cent, $30.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-chrome, 4 to 6 per cent carbon, 25 cents per pound; 2 per cent carbon, nominal.

Ferro-vanadium, nominal, Pittsburgh.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

Nickel, nominal.

Ferro-tungsten, nominal.

Cobalt metal, nominal, Pittsburgh.

Aluminum, nominal, Pittsburgh.

Ferro-molybdenum, Pittsburgh, nominal.

Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama canal, per 100 lbs., in carload lots, exclusive for insurance and dockage.

From New York	$0.40
From Pittsburgh	.619
From Youngstown	.619
From Niles	.619
From Wheeling	.619
From Steubenville	.619
From Johnstown	.604
From Coatesville	.545
From Steelton	.555
From Bethlehem	.529
From Cleveland	.65
From Chicago	.765

SEMI-FINISHED MATERIAL

Open hearth billets, Phila.	$40.00 to 42.00
Bessemer billets, Phila.	33.00 to 35.00
Forging billets, Phila.	50.00 to 55.00
Forging billets, Pbgh (nominal).	55.00
Forging billets, Chgo.	50.00 to 55.00
Wire rods, Pittsburgh (nom.).	50.00
Bessemer billets, Youngstown	34.00 to 35.00
Open hearth billets, Youngstown	35.00 to 40.00
Bessemer billets, Pittsburgh	34.00 to 35.00
Open hearth billets, Pittsburgh	35.00 to 40.00
Bess. sheet bars, Youngstown	34.00 to 35.00
Op. h'th sheet bars, Youngstown	35.00 to 40.00
Bess. sheet bars, Pittsburgh	34.00 to 35.00
Open h'th sh. bars, Pbgh	35.00 to 40.00
Muck bar, Pittsburgh (nominal).	36.00 to 38.00

SKELP

Grooved steel skelp	1.90c
Sheared steel skelp	1.95c

RAILS AND TRACK MATERIAL

Stand. Bess. rails, Pbgh & Chg.	1.25c
Stand. op-h'th rails, Pbgh. & Chg.	1.34c
Light rails, 8 to 10 lbs., Pbgh.	1.85c
Light rails, 8 lb., Chgo.	1.67c
Light rails, 12 to 14 lbs., Pbgh.	1.80c
Light rails, 12 lbs., Chgo.	1.62c
Light rails 16 to 20 lbs., Pbgh.	1.75c
Light rails 16 to 20 lbs., Chgo.	1.57c
Light rails 25 to 45 lbs., Pbgh.	1.70c
Light rails 25 to 45 lbs., Chgo.	1.52c
Relaying rails, standard, Pbgh. & Chgo.	$23.00 to 24.00
Relaying rails, light, Chgo.	21.50 to 22.50
Angle bars, st. sect., Pbgh. base.	1.50c to 1.75c
Angle bars, st. sections, Chicago	1.50c to 1.75c
Spikes, railroad, Pbgh.	2.25c
Spikes, railroad, Chgo.	2.25c to 2.35c
Track bolts, Pbgh.	2.50c
Track bolts, Chgo.	2.60c to 2.80c
Tie plates, Chgo.	40.00 to 42.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—

Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18

Buffalo to:—

Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60

Virginia furnaces to:—

Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88

Birmingham, Alt., to:—

Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75

Chicago to:—

Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58

Ironton and Jackson, O., to:—

Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, Pbgh. (con.)	2.00c to 2.25c
Structural shapes, Chgo.	2.19c to 2.49c
Structural shapes, Philadelphia	2.159c to 2.409c
Structural shapes, New York	2.169c to 2.419c
Struc. shapes, San Francisco	2.00c to 2.05 c
Tank plates, Chgo.	2.29c to 2.54c
Tank plates, Pbgh. (con.)	2.10c to 2.50c
Tank plates, Philadelphia	2.259c to 2.659c
Tank plates, New York	2.269c to 2.669c
Bars, soft steel, Pbgh.	1.90c to 2.00 c
Bars, soft steel, Chgo.	2.19c to 2.49c
Bars, soft steel, Pbgh. (con.)	2.00c to 2.25c
Bars, soft steel, New York	2.169c to 2.269c
Hoops, carloads, Pbgh.	2.20c
Bands, Pittsburgh	2.00c
Shafting, Pbgh., contr. carloads	40 off
Bar iron, C go.	1.90c to 2.00 c
Bar iron, Philadelphia	2.409c
Bar iron, New York	2.419c
Bar iron, Cleveland	2.25 c
Bar iron, Pittsburgh	2.20c to 2.30c
Hard steel bars, Chgo.	1.90c to 2.00c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	2.60c to 2.75 c
No. 28, black, Chgo.	2.79c to 2.94c
No. 28, tin mill, black, Pbgh.	2.50 c
No. 28, galvanized, Pbgh.	4.75c to 5.25 c
No. 28, galvanized, Chgo.	5.19 c
No. 10, blue anl'd, Pbgh.	2.60c to 2.80c
No. 10, blue anl'd, Phila.	2.759c to 3.009c
No. 10, blue anl'd., Chgo.	2.94 c
Tin plate, 100 lb., coke base	$3.75 to 4.00

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickl'd, cold roll. and re-anld.	30 cents
Hot roll'd pickled and anl., tin mill.	25 cents
Full pickled, cold rolled and re-anld.	50 cents
Auto sheets	75 cents
Blue stove pipe stock	10 cents
Range steel	30 cents
Re-squaring	10 cents
Roller leveling	10 cents
Patent leveling and re-squaring	35 cents
Oiling sheets	10 cents
Deoxiding	10 cents
Lime finish	10 cents
Open-hearth stamping steel, free fr. mill scale	55 cents
Special open hearth deep stpg. steel, free from mill scale	80 cents
Extra deep special auto body stock.	1.25
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents

No reduction for sheets not annealed.

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsburgh.)

	Black. Butt-weld.	Galv. Butt-weld.
Steel, ⅜ to 3 inches	66	60½
Iron, ⅜ to 1½ inches	66	48
	Lap-weld.	
Steel, 2½ to 6 inches	77	62½

BOILER TUBES

Steel, 3½ to 4½ inches l. c. l.	64
Iron, 3½ to 4½ inches, l. c. l.	53

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.20
Plain, wire, jobbers', Pittsburgh	2.05
Galvanized wire, jobbers', Pbgh.	2.75
Polished staples, Pbgh.	2.35
Galvanized staples, Pbgh.	3.05
Barb wire, painted, jobbers', Pbgh.	2.35
Barb wire, gal., jobbers', Pbgh.	3.05

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled threads, 70, cut threads 65 and 10; larger or longer, 60 and 5.

Machine bolts with hot pressed nuts, ⅜ x 4 inches, smaller or shorter, rolled 70 and 5; cut, 70; larger or longer, 60 and 10.

Cold pressed, semi-finished hex. nuts, 75 and 10.

Gimlet and cone point lag bolts, 70 and 10. Hot pressed square, blank or tapped nuts, $4.00 off list; hot pressed hexagon blank or tapped, $4.20.

Cold pressed square, blank or tapped, $3.75 off; hexagon, blank or tapped, all sizes, $4.75.

RIVETS

Structural rivets, Pbgh	2.70c
Structural rivets, Chgo. delivery	2.75c
Boiler rivets, Pbgh	2.80c
Boiler rivets, Chgo. delivery	2.85c

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	2.00c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	4.00c

COLD ROLLED STRIP STEEL

Base price $4.00 per 100 pounds, hard, coils 1½ inches and wider and by .100 inches and heavier.

Extras.

.10 to .19 carbon. 1½ inches and wider.

Coils.

	Hard.	Soft.
0.100 and heavier	Base	$0.25
0.050 to 0.099	$0.05	0.30
0.035 to 0.049	0.20	0.45
0.031 to 0.034	0.35	0.75
0.025 to 0.030	0.45	0.85
0.020 to 0.024	0.55	0.95
0.017 to 0.019	1.35	1.35
0.015 to 0.016	1.75	1.75
0.013 to 0.014	2.45	2.45
9.012	2.80	2.80
0.011	3.15	3.15
0.010	3.50	3.50

Lengths 24 Inches and Over.

	Hard.	Soft.
0.100 and heavier	$0.10	$0.35
0.050 to 0.099	0.20	0.45
0.035 to 0.049	0.35	0.60
0.031 to 0.034	0.60	1.00
0.025 to 0.030	0.85	1.25
0.020 to 0.024	1.05	1.45
0.017 to 0.019	2.45	2.45
0.015 to 0.016	2.85	2.85
0.013 to 0.014	3.70	3.70
0.012	4.30	4.30
0.011	4.65	4.65
0.010	5.00	5.00

Extras as per card of Jan. 1, 1916.

CAST IRON WATER PIPE

Four-inch, Chicago	$32.50 to 33.00
Six-inch and larger, Chicago	29.50 to 30.00
Six-inch Class B, New York	29.50
Four-inch, Class B, New York	32.50
Four-inch, Birmingham	26.00 to 27.00
Six-inch and larger, Birmingham	24.00 to 25.00

Light weight water and gas pipe, $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	2.50c
Steel squares, 2-in. & ov., Cleve.	2.75c
Steel rounds, 2 in. and over	3.10c
Steel bars, under 2 in., Cleveland	2.60c
Steel bars, Philadelphia	2.60c
Steel bars, New York	2.50c
Steel bars, St. Louis	2.55c
Steel bars, Cincinnati	2.55c
Steel bars, St. Paul	2.60c
Steel bars, over 2-inch, Buffalo	3.15c
Steel bars, Buffalo	2.45c
Iron bars, Chicago	2.30c
Iron bars, Cleveland	2.55c
Iron bars, St. Louis	2.50c
Iron bars, Cincinnati	2.50c
Iron bars, Philadelphia	2.60c
Iron bars, New York	2.50c
Plates, Chgo.	2.70c
Shapes, Chgo.	2.50c
Shapes, St. Louis	2.55c
Shapes, St. Paul	2.60c
Shapes, Cleveland	2.60c
Shapes and plates, Buffalo	2.45c
Shapes and plates, Cincinnati	2.50c
Plates, St. Louis	2.75c
Plates, St. Paul	2.80c
Shapes, Philadelphia	2.50c
Shapes, New York	2.50c
Plates, Cleveland	2.70c
Plates, New York	2.70c
Plates, Philadelphia	2.75c
No. 10 blue anl. sheets, Chgo	2.95c
No. 10 blue anl. sheets, Clevel'd	3.25c
No. 10 blue anl. sheets, Buffalo	2.70c
No. 10 blue anl. sheets, St. Louis	3.00c
No. 10 blue anl. sheets, Cinci	3.15c
No. 10 blue anl. sheets, St. Paul	3.05c
No. 28 black sheets, Chgo	3.00c
No. 28 black sheets, Cleveland	2.95c
No. 28 black sheets, Cincinnati	3.00c
No. 28 black sheets, St. Louis	3.20c
No. 28 black sheets, St. Paul	3.25c
No. 28 galv. sheets, Chgo	4.80c to 5.00c
No. 28 galv. sheets, Cleveland	5.25c
No. 28 galv. sheets, Cincinnati	5.25c
No. 28 galvanized sheets, St. L.	5.25c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Arch bars and transoms, Chgo.	$18.00 to 18.50
Arch bars and transoms, St. L.	18.00 to 18.50
Angle bars, iron, Chicago	17.25 to 17.75
Angle bars, steel, St. Louis	13.50 to 14.00
Arch bars and transoms, Chgo.	18.00 to 18.50
Arch bars and transoms, St. L.	16.50 to 17.00
Cut forge, Chicago	14.00 to 14.25
Knuckles, coup., Chgo	15.50 to 16.00
Springs	16.00 to 16.25
Knuckles, coup., St. L.	15.50 to 16.00
Locomotive tires, Chicago	16.00 to 16.50
Locomotive tires, St. Louis	15.00 to 15.50
Railroad wrought, No. 1, Chgo.	15.00 to 15.50
Railroad wrought, No. 1, Cleve.	18.00 to 18.50
Railroad wrought, No. 1, St. L.	14.50 to 15.00
Railroad wrought, No. 1, Cinci.	12.00 to 12.50
Railroad wrought, No. 2, Chgo.	14.00 to 14.25
Railroad wrought, No. 2, St. L.	14.50 to 15.00
Shafting, Chgo.	17.00 to 17.50
Shafting, St. Louis	17.00 to 17.50
Springs, Chgo.	16.25 to 16.50
Steel car ales, B'ham	14.50
Steel car axles, Chicago	21.75 to 22.25
Steel car ales, St. Louis	21.00 to 22.00
Pipes and flues, Chicago	11.00 to 11.50
Pipes and flues, Cleve'd (nom.)	13.00 to 13.75

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—

New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Minneapolis and St. Paul	32.9 cents
Denver	68.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Boiler plate, cut, No. 1, Chgo.	11.50 to 12.00
Boiler plate, cut, No. 1, St. L.	7.00 to 7.50
Boiler punchings, Chicago	14.00 to 14.50
Busheling, No. 1, Chicago	12.00 to 12.50
Busheling, No. 1, Cleveland	14.00 to 14.50
Busheling, No. 1, Cincinnati	9.75 to 10.25
Busheling, No. 1, St. Louis	11.50 to 12.00
Busheling, No. 2, Chicago	8.75 to 9.25
No. 1 cast	13.00 to 13.50
Bundled sheet, Cincinnati	8.25 to 8.75
Cast, No. 1, Cleveland	14.25 to 14.75
Cast, No. 1, Cincinnati	11.25 to 11.75
Cast, No. 1, St. Louis	9.50 to 10.00
Cast borings, Chicago	7.25 to 7.75
Cast borings, Cleveland	8.50 to 8.75
Cast borings, Cincinnati	7.25 to 7.75
Cast borings, St. Louis	7.00 to 7.50
Machine shop turnings, Chgo.	8.00 to 8.50
Machine shop turnings, Cleveland	7.25 to 7.50
Machine shop turnings, Cinci.	6.75 to 7.25
Machine shop turnings, St. L.	8.00 to 8.50
Malleable agricultural, Chgo.	12.00 to 12.50
Malleable agriculture, St. Louis	10.50 to 11.00
Malleable railroad, Chicago	14.25 to 14.50
Malleable, Cincinnati	7.75 to 8.25
Malleable railroad, St. Louis	12.00 to 12.50
Pipes and flues, Chgo.	11.75 to 12.25
Pipes and flues, St. Louis	10.50 to 11.00
Stove plate, Chicago	11.00 to 11.50
Stove plate, Cleveland	10.25 to 10.75
Stove plate, Buffalo	9.50 to 10.00
Stove plate, Cincinnati	7.75 to 8.25
Stove plate, St. Louis	9.50 to 10.00

(Gross tons.)

Boiler plate sheared, Buffalo	13.00 to 13.50
Busheling, No. 1, Buffalo	13.50 to 14.00
Busheling, No. 1, Pbgh	14.50 to 15.00
Busheling, No. 2, Buffalo	11.00 to 11.50
Bundled sheet, Pittsburgh	14.50
Bundled sheet, Cleveland	12.75 to 13.25
Bundled sheet, Buffalo	12.00 to 12.50
Car wheels (iron), Pittsburgh	15.50 to 16.00
Car wheels (steel), Pittsburgh	18.00 to 18.50
Car wheels, Chicago	14.00 to 14.25
Car wheels, eastern Pa.	16.00 to 16.50
Car wheels, Buffalo	15.25 to 15.75
Car wheels, N. Y.	14.00 to 14.50
Car wheels, St. Louis	13.00 to 13.50
Cast borings, New York	9.00 to 9.25
Cast borings, eastern Pa.	11.50 to 12.00
Cast borings, Buffalo	9.25 to 9.75
Cast borings, Pittsburgh	11.25 to 11.50
Cast, No. 1, eastern Pa.	17.50 to 18.00
Cast, No. 1, Pittsburgh	15.50 to 16.00
Cast, heavy No. 1, N. J. points	16.50 to 17.00
Forge, No. 1, eastern Pa.	14.00 to 14.50
Frogs, switches, guards, Chgo.	15.00 to 15.50
Frogs, switches, guards, St. L.	15.25 to 15.75
Grate bars, Buffalo	11.00 to 11.50
Grate bars, N. J. points	13.25 to 13.50
Heavy axle turnings, Buffalo	12.00 to 12.50
Heavy melting steel, Pbgh	17.50 to 18.00
Heavy melting steel, Buffalo	16.50 to 17.00
Heavy melting steel, Chicago	15.00 to 15.50
Heavy melting steel, Cleveland	16.25 to 16.75
Heavy melting steel, Cincinnati	13.75 to 14.25
Heavy melting steel, eastern Pa.	16.50 to 17.00
Heavy melting steel, New York	14.25 to 14.50
Heavy melting steel, St. Louis	15.25 to 15.75
Iron rails, Chicago	17.25 to 17.75
Iron rails, Buffalo	17.00 to 17.50
Iron rails, Cincinnati	13.75 to 14.25
Iron rails, St. Louis	16.00 to 16.50
Iron rails, Cleveland (nom.)	17.00 to 18.00
Iron axles, Pittsburgh	25.00 to 26.00
Iron axles, Cincinnati	20.25 to 20.75
Iron axles, eastern Pa.	26.00 to 27.00
Iron axles, Chgo.	24.00 to 24.50
Iron axles, Buffalo	23.00 to 23.50
Iron axles, St. Louis	22.25 to 22.50
Low phos. steel, Buffalo	20.50 to 21.00
Low phosphorus steel, Pbgh	21.50 to 22.00
Low phos. steel, eastern Pa.	22.00 to 22.50
Machine shop turnings, Buffalo	7.75 to 8.25
Mch. shop turnings, New York	8.50 to 8.75
Mch. shop turnings, Pbgh	9.00 to 9.50
Mch. shop turnings, eastern Pa.	10.75 to 11.00
Mall. railroad, Cleveland	16.25 to 16.50
Malleable railroad, Pittsburgh	16.00 to 16.25
Malleable railroad, Buffalo	15.25 to 15.75
Malleable railroad, eastern Pa.	14.50 to 15.00
R. R. and mch. cast, No. 1, Bfl.	15.25 to 15.75
R. R. wrought, No. 1, Buffalo	17.50 to 18.00
Railroad wrought, No. 1, E. Pa.	22.50 to 23.00
R. R. wght., No. 1, New York	21.00 to 21.50
Railroad wrought, No. 1, Pbgh.	18.50 to 19.00
Reroll. rails, 5 ft. & ov., Pbgh.	18.00 to 18.50
Reroll. rails, 5 ft. & ov., Chgo.	17.00 to 17.50
Reroll. rails, 5 ft. & ov., Cleve.	16.25 to 16.75
Reroll. rails, 5 ft. & ov., E. Pa.	19.00 to 20.00
Reroll. rails, 5 ft. & ov., St. L.	17.50 to 18.00
Shafting, New York	19.00 to 19.50
Shafting, eastern Pa.	23.00 to 23.50
Shoveling steel, Chicago	14.75 to 15.00
Shoveling steel, St. Louis	14.00 to 14.50
Steel rails, short, Chicago	16.50 to 17.00
Steel rails, short, Cleveland	18.25 to 18.50
Steel rails, short, St. Louis	15.25 to 15.75
Steel car axles, New York	22.00 to 23.00
Steel car axles, Buffalo	23.00 to 23.50
Steel car axles, Cleveland	24.00 to 24.50
Steel car axles, eastern Pa.	24.00 to 25.00
Stove plate, N. J. points	13.25 to 13.50
Stove plate, Pittsburgh	11.50 to 12.00
Stove plate, eastern Pa.	12.50 to 13.00
Wrought pipe, New York	13.75 to 14.00
Wrought pipe, Buffalo	13.00 to 13.50
Wrought pipe, eastern Pa.	15.25 to 15.75

Opportunities

POSITIONS OFFERED

Minimum ad. set solid, 50 words $1.00
Minimum ad. all caps, 50 words $1.50

POSITIONS WANTED

Minimum ad. set sold, 25 words $.50
Minimum ad. all caps, 25 words $.75

(Each additional word set solid, 2c.—Each additional word all caps, 3c.)

Positions Offered

WANTED CHEMIST: — ASSISTANT chemist wanted for steel works in Ohio. Prefer one who has had experience with alloy steels. State age, and experience in full, also salary required. Address Box 739, THE IRON TRADE REVIEW, Cleveland, O.

WANTED AT ONCE, SEVERAL FIRST class draftsmen of general mill and blast furnace experience. State age, experience, present salary and salary wanted in first letter; also when available. Central location Pittsburgh. Address Box 749, THE IRON TRADE REVIEW, Cleveland, O.

WANTED AT ONCE, SEVERAL DRAFTSmen experienced in power plant and general piping work. State experience, present salary and salary wanted in first letter; also when available. Central location Pittsburgh. Address Box 750, THE IRON TRADE REVIEW, Cleveland, O.

UNDERSIGNED COUNSEL WILL CONfidentially negotiate preliminaries for important executive, technical, administrative and professional positions, insuring strictest privacy. Not an agency, but a highly-endorsed, high grade method of negotiating preliminaries only, for $2,000 to $12,000 men. Send address only for explanation. R. W. Bixby, Fl Niagara Square, Buffalo, N. Y.

WANTED:—TWO HEATERS FOR MERchant bar iron furnaces working to 14-inch and 20-inch trains. Address Box 757, THE IRON TRADE REVIEW, Cleveland, O.

WANTED: — ONE OR TWO EXPERIenced roughers on 14-inch and 20-inch merchant bar iron trains. Men with some knowledge of rolling preferred. Address Box 758, THE IRON TRADE REVIEW, Cleveland, O.

THE BEST WAY TO GET A GOOD position in drafting or engineering is to file an application direct with some of our clients who are depending on us to get competent and experienced applicants for their vacant positions. Send stamp for blank and list of vacant positions. The Cleveland Engineering Agency Co., Rose building, Cleveland, O.

WANTED:—A MAN CAPABLE OF ACTing as general foreman for a steel foundry making high grade small castings principally for the automobile trade. In reply give detailed information. All answers will be kept strictly confidential. The insertion of this ad is known to all of our present foremen. Address Box 759, THE IRON TRADE REVIEW, Cleveland, O.

WANTED: — NIGHT FOREMAN FOR Steel Foundry in Detroit. One who is familiar with Railroad work preferred. Address Box 761, THE IRON TRADE REVIEW, Cleveland, O.

WANTED: — EXPERIENCED FORGING salesman. Splendid opportunity for an energetic man, capable of co-operating with Operating Department in building up a forging business. Thorough knowledge of forgings and buyers of forgings imperative. Experience and references in first letter necessary. Address Box 765, THE IRON TRADE REVIEW, Cleveland, O.

WE CAN OFFER THE RIGHT PARTY A good opportunity to become interested in the foundry business. If interested address Cumberland Foundry & Mfg. Co., Nashville, Tenn.

GRAY IRON FOUNDRY FOREMAN wanted by large concern in Bridgeport, Conn., employing 60 to 75 molders on light and medium gated work. Must be familiar with modern foundry and cupola practice, capable of handling men and able to show results. State age, experience, references and salary. Address Box 768, THE IRON TRADE REVIEW, Cleveland, O.

Positions Wanted

SUCCESSFUL EQUIPMENT SALESMAN would like to communicate with manufacturers desiring first class representation in Pittsburgh district. Best of references. Salary on commission. Address Box 751, THE IRON TRADE REVIEW, Cleveland, O.

BLAST FURNACE SUPERINTENDENT, competent, successful and up-to-date in furnace practice. For 10 years making Bessemer iron. Now employed at a record breaking plant making basic iron. Wishes position with a company appreciating good work. Can refer you to past and present employer. Address Box 755, THE IRON TRADE REVIEW, Cleveland, O.

BY MAN WITH THOROUGH KNOWLEDGE OF FOUNDRY BUSINESS, HIGH EXECUTIVE ABILITY AND CHARACTER WITH UNSURPASSED REFERENCES. FIFTEEN YEARS IN AN OFFICIAL CAPACITY; SEEKS POSITION AS SUPERINTENDENT OR WORKS MANAGER WITH THOROUGHLY RELIABLE CONCERN. ADDRESS BOX 756, THE IRON TRADE REVIEW, CLEVELAND, O.

AS FOUNDRY SUPERINTENDENT OR manager; graduate in metallurgy and mix by analysis; have wide experience on loams dry and green sand in brass, bronze, steel and iron; expert on molding machines and metal plates, estimating; wood and metal pattern-making; spent 5 years as chief foundry engineer and adviser in U. S. navy yard; age 37, married; can furnish highest references. Address Box 767, THE IRON TRADE REVIEW, Cleveland, O.

WOULD LIKE TO COMMUNICATE with malleable iron firm, desirous of an A-1 general foundry foreman or superintendent. Address Box 654, THE IRON TRADE REVIEW, Cleveland, O.

A-1 FURNACE MAN, 15 YEARS BLOWing and General Foreman, desires to go with good concern. Best of references. Address Box 640, THE IRON TRADE REVIEW, Cleveland, O.

For Employes

The weekly exchange where competent—wide-awake—industrious—men with initiative can find a wide market for the sale of their services.

Positions Wanted

POSITION AS BLOWER OR IRON Foreman by a blast furnaceman of good education and wide experience. Excellent references. Address Box 763, THE IRON TRADE REVIEW, Cleveland, O.

YOUNG MAN DESIRES POSITION IN steel trade, willing to go into mill, with opportunity to get into sales department. Have had three years experience in forging business, two years as assistant to superintendent of forge shops. Can furnish best of references. Address Box 762, THE IRON TRADE REVIEW, Cleveland, O.

COMPETENT BLAST FURNACE SUPERintendent, technically trained; twelve years experience in modern and efficient practice, management and operation with large plant. Thoroughly understand ores, amount of temperature, blast and material required to produce different kinds of iron. Well versed in modern practice. Desire change; investigate my record. Address Box 764, THE IRON TRADE REVIEW, Cleveland, O.

ORNAMENTAL IRON AND STRUCTUral steel man; desires connection with iron or steel works, graduate civil and mechanical engineer. Can take financial interest and devote all my time to the business. Experienced in selling and contracting for building products, bridges and reinforcing steel, competent designer and estimator. Address Box 742, THE IRON TRADE REVIEW, Cleveland, O.

HIGH GRADE FOREMAN WITH FIRST rate experience in foundry practice. Can mix by analysis. At present I have charge of a general jobbing shop. Heavy and light work. Prepared to talk business with the right parties. Address Box 695, THE IRON TRADE REVIEW, Cleveland, O.

WANTED: POSITION BY MECHANICAL ENGINEER. Eighteen years' experience as die sinker and master mechanic. Address Box 716, THE IRON TRADE REVIEW, Cleveland, Ohio.

WANTED: — POSITION AS TRAFFIC manager.—Sober, steady, middle-age man, married, 17 years' railway experience in official capacity, wide experience in handling traffic matters before Interstate Commerce Commission and various State Commissions, familiar with rate situations in all territories, at present permanently employed, very best of references as to ability and character, desires permanent connection with manufacturing, jobbing or industrial concern. Address Box 710, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED. BY BLAST FURnace superintendent. Twenty years experience in the iron business. Good references. Address Box 728, THE IRON TRADE REVIEW, Cleveland, O.

WHEN YOU NEED A HIGH GRADE executive, engineer, draftsman, or any technical man, consult The Engineering Agency, Inc., (Est. 21 years) 1662 Monadnock Block, Chicago.

AS GENERAL FOUNDRY FOREMAN; 30 years wide experience in steam and gas engines; tool machinery and architectural iron castings; up-to-date in all foundry practice; thoroughly experienced in loam, dry and green sand work; perfect in core work; wants to locate with large concern west of Chicago; open shop preferred. A-1 references. Address Box 738, THE IRON TRADE REVIEW, Cleveland, O.